THE MARINE REVIEW

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DETROIT RIVER MAIL BOAT

The C. F. Bielman Jr., whose plans and photographs we publish herewith, is already a familiar sight to the majority of the sailors on the great lakes. She was put in commission last fall as mail boat on the Detroit river, replacing the time-honored Florence B. in this service. Her plans, which are from the office of Carlton Wilby of Detroit, show many unique features necessitated by the peculiar nature of the work for which she was especially designed.

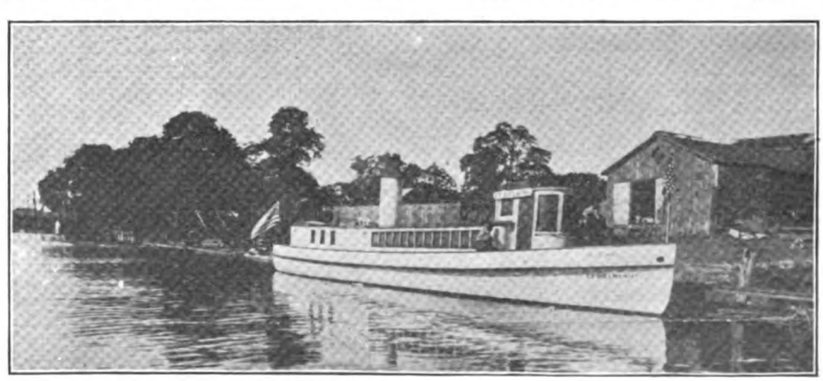
U. S. MAILBOAT C. F. BIELMAN JR.
Photo by M. M. McDonald.

Perhaps the most noticeable point in the design is the extreme flare given the forward sections and carrying well aft of the greatest beam. It will be seen that this deck overhang is quite necessary in running alongside of a moving vessel in order that there may always be sufficient clear water between the two boats to obviate any tendency to suck together. At the same time it facilitates the transfer of mail to be as close to the larger vessel as practicable. In the short, nasty seas that run with a southwest wind up the river, this flare has also proven of great value, affording great reserve buoyancy to check diving, and being so shaped as to throw a heavy head sea clear, even when running full speed into it.

It was very important that she should be able to turn quickly and for this reason the deadwood forward and aft was cut away as much as possible. In this respect she has proven extremely satisfactory, being able to turn in her own length, and at the same time, because of the considerable drag given to her keel, is reasonably steady on her helm.

This drag also enabled the designer to work the center of buoyancy well aft, for although not absolutely the best from a speed standpoint, this position was desirable so that the machinery might be worked as far aft as practicable, to give added space in the mail-sorting room.

The compromise stern was adopted in preference to the regular fantail, partly because of its acknowledged su-



U. S. MAILBOAT C. F. BIELMAN JR. JUST AFTER SHE WAS COMPLETED.
Built by Johnston Bros., Ferrysburg, Mich.

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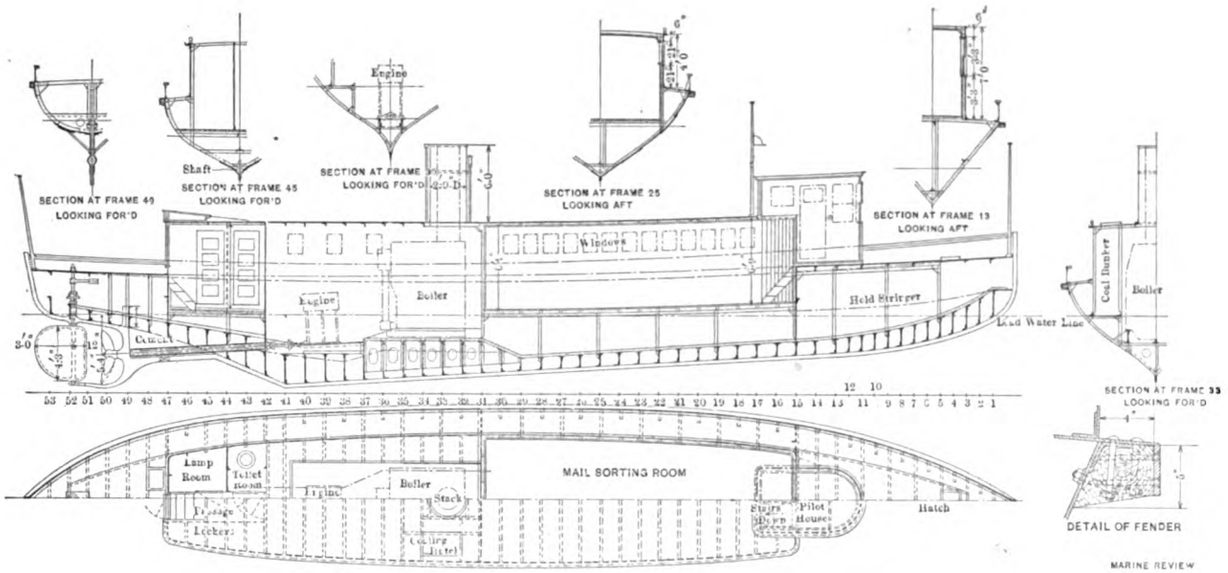


SECTIONAL DRAWING OF THE MAILBOAT C. F. BIELMAN JR.

periority on a small boat in rough water, and also because with a rowboat in tow, there is less chance of its catching under and swamping, with this type of stern than with the fantail.

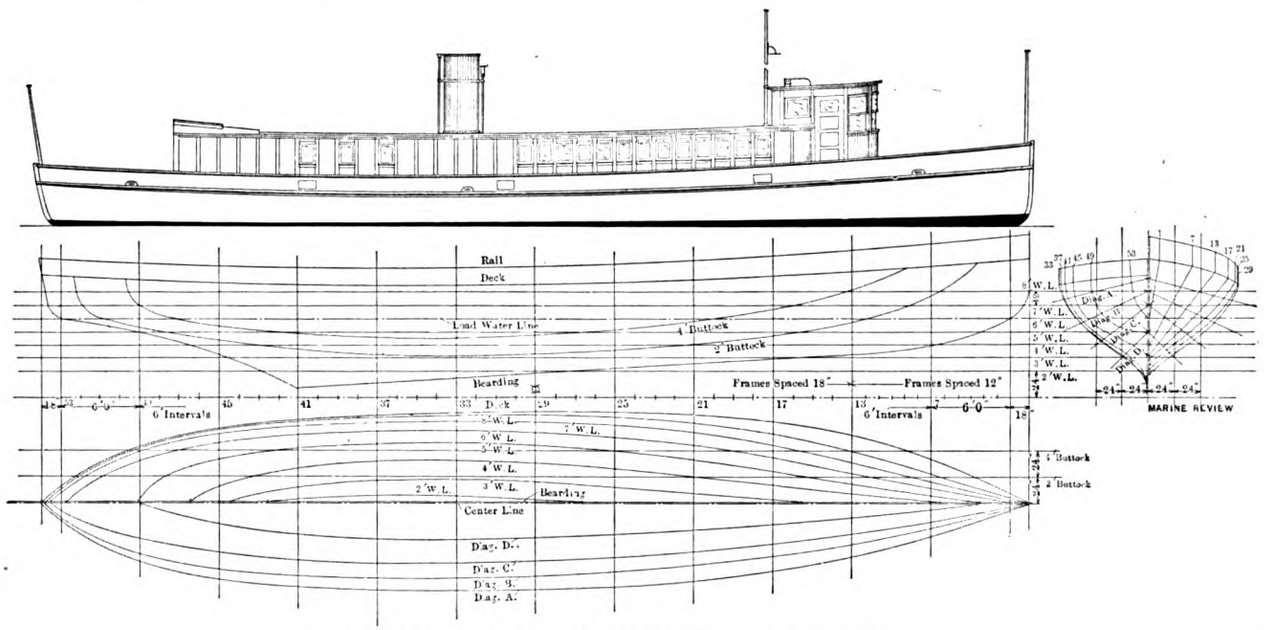
The boat was built last summer for C. F. Bielman, of Detroit, by Johnston Bros., of Ferrysburg, Mich. Her propelling machinery consists of a Taylor water-tube boiler supplying steam at a pressure of 250 lb. to a fore and aft compound engine built by the Detroit River Iron Works. This engine, with cylinders 6½ in. and 13 in. diameter and 8-in. stroke, drives the boat at a normal speed of 13 miles.

The hull is entirely of mild steel, with deckhouse and pilot-house also of steel, the interior finish being oak. Everything has been kept as light as possible consistent with the necessary strength, the main frames being 2 in. x 2 in. x 2.5 lb. angles except in machinery space, where they are 2 in. x 2 in. x 3.2 lb., with a uniform spacing of 18 in. except forward of the collision bulkhead, where the spacing is reduced to 12 in. This additional strengthening forward is necessary because of floating ice which is often encountered in the latter part of the season. The shell is in general of 7.65-lb. plate, doubled forward at the waterline, with garboard and sheer strakes of 10.2-lb. plate.

Following are her principal dimensions, molded: Length over all, 75 ft.; length water line, 72 ft.; beam, extreme, 13 ft. 9 in.; beam, waterline, 11 ft. 9 in.

The Newport News Ship Building & Dry Dock Co., Newport News, Va., has been awarded contract by the U. S. army engineer at Wilmington, N. C., for the construction of two steel six-pocket dump scows at a cost of $30,500.

The little volume known as the *Sailor's Magazine,* published by the Seamen's Friend Society, has been bound in book form.



SECTIONAL DRAWING OF THE MAILBOAT C. F. BIELMAN JR.

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UNIQUE RUDDER FRAME REPAIR.

A repair, surpassing anything hitherto attempted in marine work, was successfully carried out at Buffalo recently, on the rudder frame of the steamship Duluth, of the Western Transit Co. This vessel broke her rudder frame in some unknown manner, the break appearing above the water line when the vessel was running light. Upon consultation with the Goldschmidt Thermit Co., P. J. Curry, superintendent of the Western Transit Co., decided to make the repair by welding the rudder frame in place by the Thermit process.

The undertaking was one of considerable magnitude, as the vessel was 404 ft. long, 50 ft. beam and of 6,400 tons. The section to be welded was 2½ in. by 9½ in. in size. Furthermore, to add to the difficulty, all work of preparation had to be carried on from two small rafts attached to the rudder. As there was considerable relative motion between the rafts and the vessel, especially when in the wind, or when a boat passed, it was impossible to support anything from the rafts. All appliances had, therefore, to be made fast to the rudder itself or to the hull of the vessel in such a way that they would not become loosened by the motion of the vessel in the water.

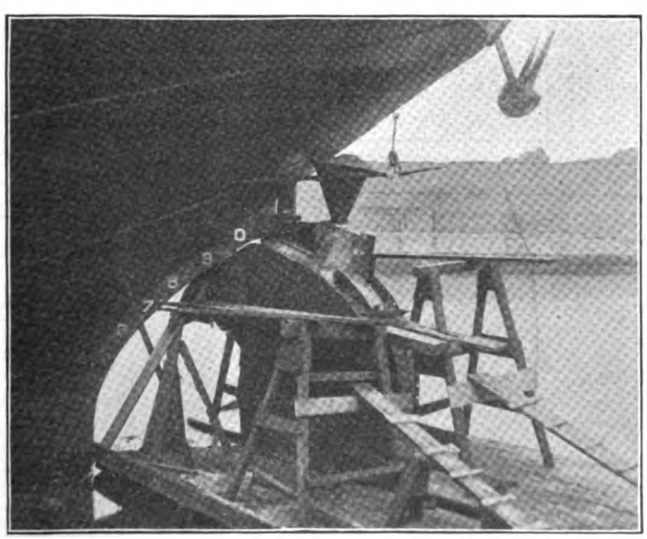
In preparing for the weld, enough rivets were first removed to permit of the check plates of the rudder being sprung back far enough to permit of a mold box, 24 in. wide, being placed in position on the rudder frame. This mold box was bolted direct to the rudder frame, after which wedges were driven between the box and the filling blocks of the rudder. Before this was done, however, a series of 1-in. holes are drilled along the line of the fracture, and the metal cut away to provide for the free flow of Thermit steel when same was poured into the mold. A collar of yellow wax was then shaped about the fracture, having its thickest part directly over the break, and sloped off towards the edges. In cross section this collar resembled a segment of a circle with a middle ordnant of 1½ in. and a width of 6½ in. The mold box was next placed in position and being filled with a mixture of fire clay and fire sand, provision being made for a narrow gate and large riser, also for a small hole at the bottom through which the wax could run out when heated. The mold box was then surrounded with a wooden box, the box being filled with sand and thoroughly tamped.

WAX IN POSITION AND MOLD BOX PARTLY ASSEMBLED.

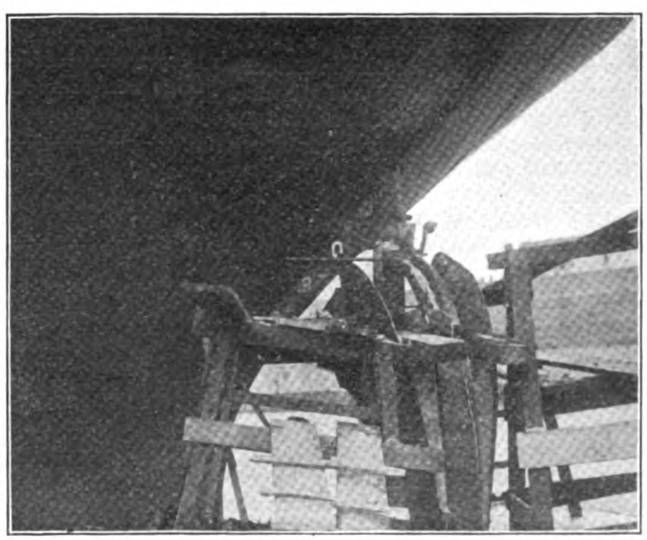
The next operation was to support the crucible over the pouring gate of the mold. To do this it was necessary to remove two rivets from the hull of the vessel and support the crucible in a specially made shank. This work was particularly difficult on account of the lack of room between the top of the mold and the hull of the vessel. It was impossible, also, to obtain a supply of compressed air close at hand for the operation of compressed air drills and the gasoline torch, as the vessel was anchored in the stream. A hose had, therefore, to be laid across the river to the shops of the Buffalo Dry Dock Co., a distance of 1,500 ft., which delayed the work to some considerable extent.

As soon as the crucible was in position it was charged with 150 lbs. of Thermit, mixed with 30 lbs. of mild steel punchings and 3 lbs. of pure metallic manganese. The flame of a powerful gasoline compressed-air torch was directed into the hole at the bottom of the mold, and the heating continued until all the wax had run out and the sections to be welded brought to a bright red heat. This requires about three hours, after which the torch was removed and the hole at the bottom plugged with a dry sand core backed up with a few shovelsful of sand. The Thermit in the crucible was then ignited and the superheated Thermit steel poured into the mold where it filled the space formerly occupied by the wax.

The mold box was allowed to stay in position for several hours after the pour in order to permit of a thorough annealing of the weld. Upon its removal it was found that perfect amalgamation had



MOLD BOX AND CRUCIBLE IN POSITION PRELIMINARY TO POURING THERMIT STEEL.



FINISHED WELD—SHOWING GATE AND RISER.

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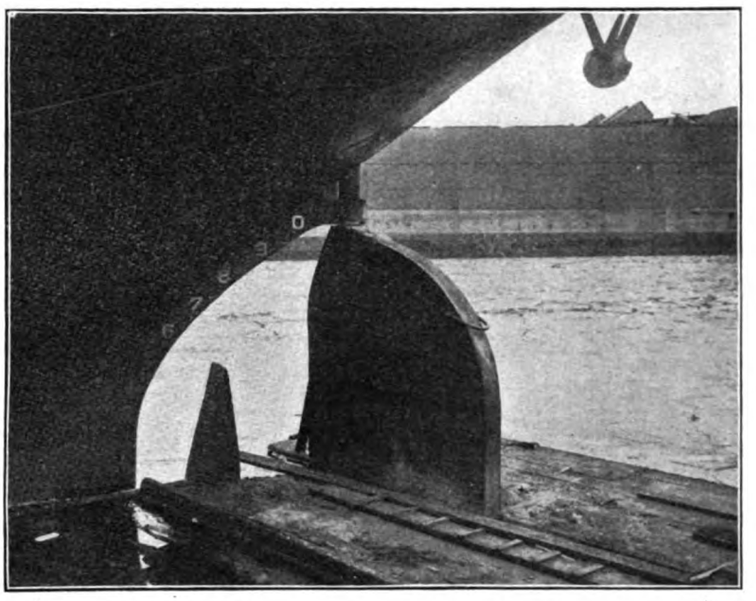


FINISHED WELD WITH RUDDER PLATES IN POSITION.

occurred between the Thermit steel and the metal of the stern rudder frame, much to the satisfaction of the owners of the vessel.

The weld was performed under the personal direction of G. E. Pellissier, engineer of the Goldschmidt Thermit Co.

OFFICIAL TRIALS OF THE FASTEST WARSHIP.

H. M. S. Tartar, the new 33-knot British destroyer, which has already, in its preliminary trials, broken the world's record for speed by attaining 35.952 knots per hour on an Admiralty course, carried out its final speed trials on Monday, Dec. 16, in the presence of various Admiralty officials. The vessel maintained the unprecedented speed of 35.363 knots throughout a continuous run of six hours duration, thus covering a total distance of nearly 233 miles during this period. On six runs over the measured Admiralty knot during the six hours' run the mean speed proved to be 35.672 knots, and the best speed attained on any one run was 37.037 knots, thus creating still another record.

Built throughout by Messrs. John I. Thornycroft & Co. at their works opposite Southampton docks, the Tartar is one of the first five high-speed ocean-going destroyers now being completed for the Admiralty. So far, her speed is very considerably in excess of that of any of the sister vessels by other builders, the fastest of which has attained only 34¼ knots.

The turbines of the Tartar are of Parsons' type, and these, as well as the Thornycroft boilers, using oil fuel, were constructed by Messrs. Thornycroft. The whole of the machinery worked excellently throughout the very severe trials, and the boilers provided an ample head of steam at all times. The oil fuel consumed was very considerably within the guaranteed limit.

The following comparative figures relating to the Tartar and other vessels of the 33-knot class are of interest:

	Speed on measured course.	Speed throughout six hours run.	Speed on best run over measured course.
Cossack	33.15	33.1	33.65
Ghurka	34.00	33.91	.....
Mohawk	34.51	34.245	35.294
Tartar	35.678	35.363	37.037

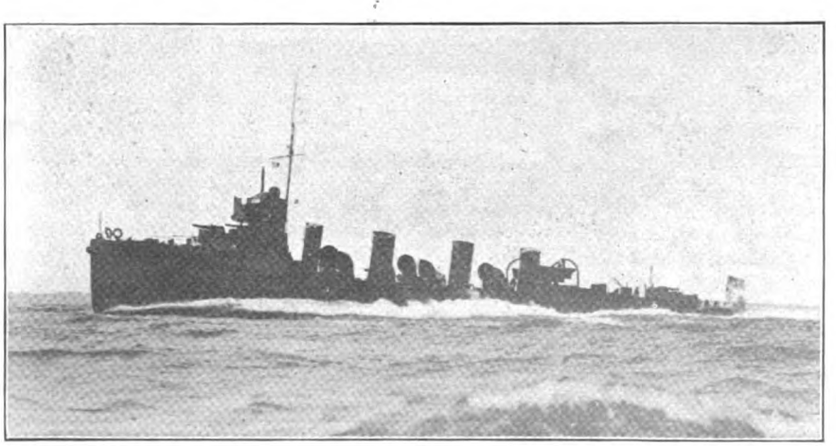
With this new record to their credit it is interesting to recall that Messrs. Thornycroft built the first torpedo boat for the British navy, and have always been in the forefront in the matter of speed of boats of this class. They created, amongst others, new world's records with the Spanish destroyer Ariete in 1886, with the Daring in 1894, the Desperate in 1896—this was the first boat to do over 30 knots—and with the Albatross in 1899; the last-named vessel, with reciprocating engines, attaining over 32 knots.

LIFE BELTS FOR LIFE SAVING SERVICE.

Significance of the higher standard of quality of the products of the National Cork Co., of Brooklyn, N. Y., is noted in a recent order received by that concern from the United States life saving service for several hundred life belts. Within 30 days after the order was received, the several hundred belts were manufactured, delivered to the government, and accepted by the inspection department. It is well known that goods manufactured for the government must be of the very best quality to pass the rigid inspection to which they are subjected, and the fact that every belt in the recent order filled by the National Cork Co. received the stamp of approval of the government inspectors, is a mark of recognition that any concern might well be proud of.

Among recent orders received from the United States life saving service, is one for several hundred cork fenders. These are to be delivered at New York within a few weeks. It is said that since this company commenced the manufacture of life preservers of the standard patent, they have never had one rejected by the government. The National Cork Co. is now occupying its new factory in Bogart street, Brooklyn, N. Y., and is turning out a line of cork goods that merit the attention of the most conservative buyers.

The Holmes Motor Co., Mystic, Conn., recently completed a 36-ft. lifeboat for the U. S. Life Saving Service. This boat is to be propelled by a 40-H. P. Holmes six-cylinder engine and it is expected that she will develop a speed of 10 miles an hour in rough weather.



THE BRITISH TORPEDOBOAT DESTROYER TARTAR.

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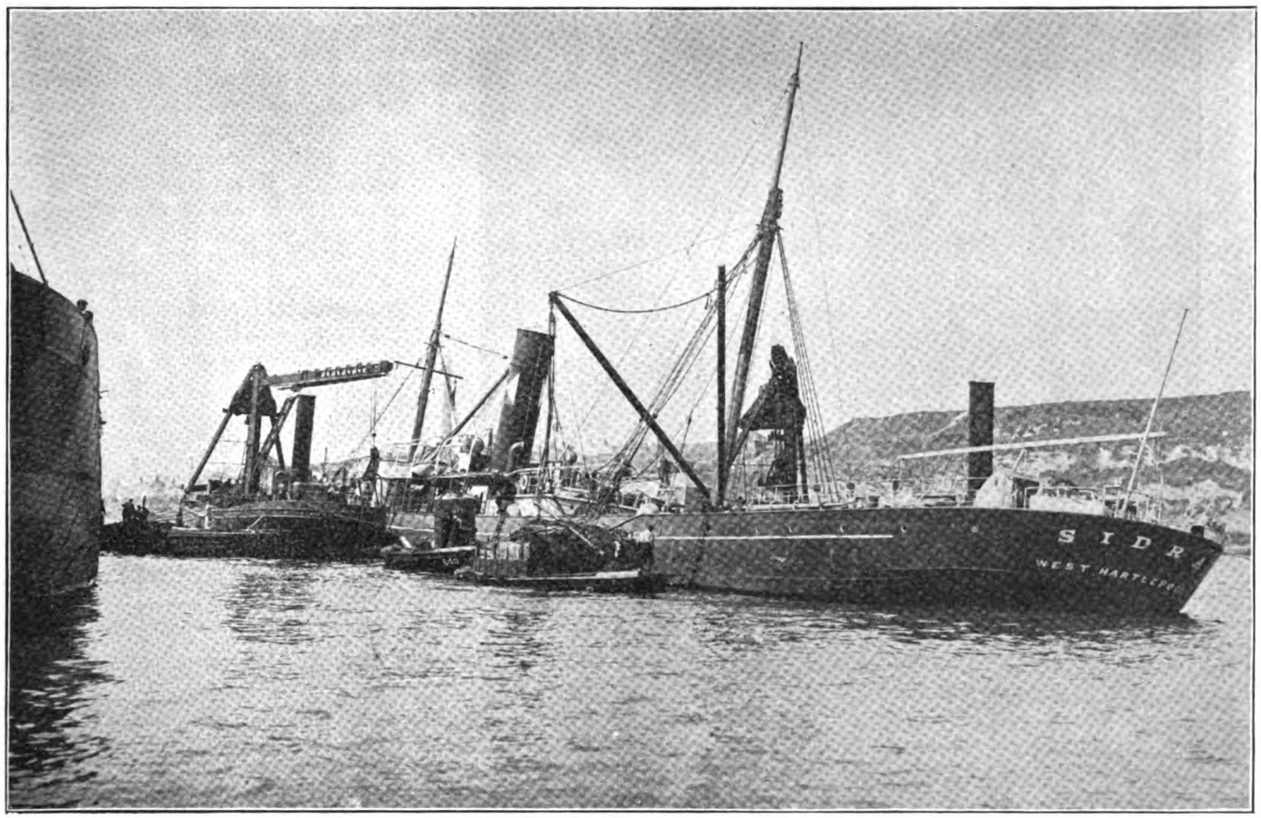
SOME INTERESTING REPAIR JOBS IN BRITISH YARDS.

With such a huge tonnage in merchant vessels carrying British registry, the repairing of ships at the various centers of shipping in the United Kingdom is quite as important an industry, judging from the multitude of hands employed, as that of ship building of the many concerns around the coasts of Britain engaged in this class of work. One of the most important is that of Smith's Dry Dock Co., Ltd., at South Shields-on-the-Tyne. This firm has favored us with three interesting photographs of recent repair jobs they have been entrusted with. The first, a good example of a "wrecking job," is that of the well-known Tyne collier Vauxhall, which was sunk after collision. This vessel settled down just inside the Tyne piers, and at high tide was completely under water. Owing to her position she was considerably exposed to the action of the sea, which materially added to the difficulties of the situation, but, notwithstanding this, she was soon slung by means of powerful steel wire hawsers, which were passed right under her bottom and made fast to lighters on either side of her, and then lifted and towed into shallow water. Here she was temporarily patched up, and towed across to one of the company's dry docks, where permanent repairs were carried out, which enabled her to return to her duties a better and stronger ship than she was before the accident, though it would seem from one illustration, showing her battered appearance, that she could hardly be worth repairing. Two other photographs, which this firm have supplied us with, relate to the steamship Ida, and the steamship Sidra. Both these vessels, like the Vauxhall, were sunk in the lower reaches of the Tyne, after collision and were subsequently raised and repaired by the company. In each case they were fully laden with coal cargoes, the bulk of which had to be removed by means of grabs before the vessels could be floated. Another notable repair job of recent date is that of the Red Star liner Finland, which managed to fall foul of the entrance to Dover harbor. The Finland sustained considerable damage to her stem, as shown by the two photographs furnished to us by Messrs. Robert Stephenson & Co., Ltd., of Hebburn-on-Tyne, who were entrusted with this difficult repair job, and carried it out with characteristic thoroughness and dispatch.

Perhaps the most remarkable repair job carried out during 1907 is that of salvage of the White Star-Australian liner Suevic by blasting her in two while on the rocks near the Lizard, and the towing of the after part, containing the machinery and most valuable part of the equipment of the ship, to Southampton.

The work of building the new fore part was undertaken by Messrs. Harland & Wolff, of Belfast, and when finished, this, in turn, was towed round to Southampton, as seen in the accompanying illustration and, there in dry dock, joined to the salved portion. The Suevic, strange as it may seem, is a better ship than ever she was, and she has just sailed again in the service in which she was engaged previous to her mishap. So much has recently been written about this engineering feat as being unique and unprecedented, that it seems to have been forgotten that only so long ago as 1899 Messrs. Swan, Hunter and Wigham Richardson, Ltd., the builders of the famous Cunard express liner, Mauretania, undertook a similar contract for the repair of the steamship Milwaukee. This vessel then belonging to Messrs. Elder, Dempster & Co., but now owned by the Canadian Pacific Railway Co., had an over-all length of nearly 500 ft. She ran on the rocks on the east coast of Scotland, and had likewise to be cut into portions, amidships, by means of dynamite cartridges. The after portion was brought partly under her own steam, stern first, to Wallsend-on-Tyne. A new



LIGHTERING THE SUNKEN COLLIER SIDRA.

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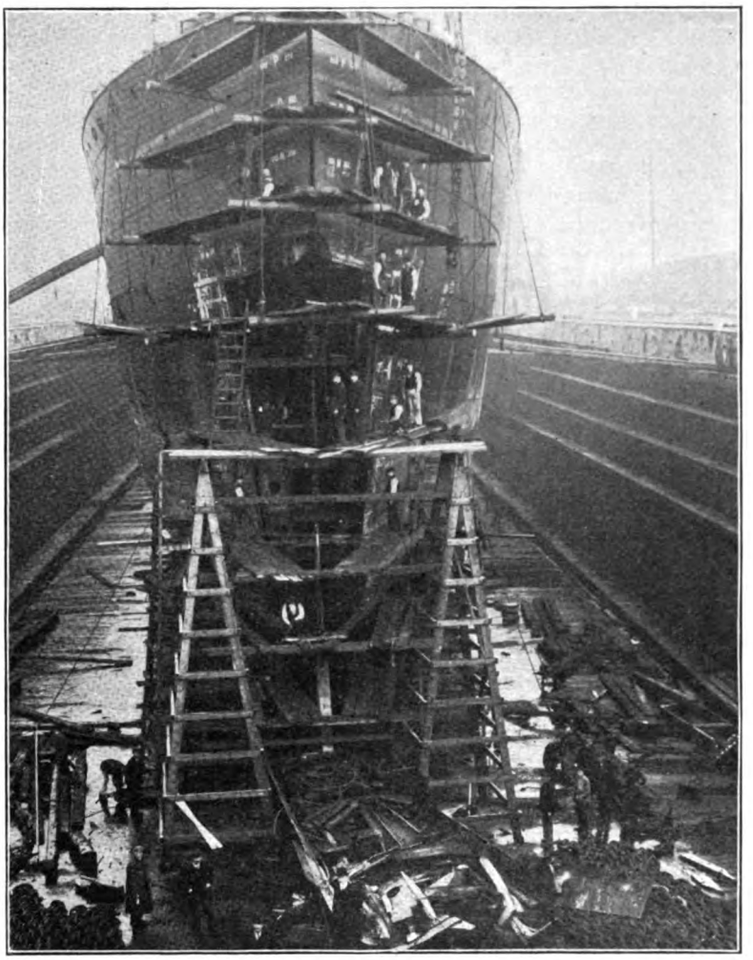

REPAIRING THE BOW OF THE RED STAR LINER FINLAND.

forepart, as in the case of the Suevic, was constructed, duly launched, and the old and new portions having been towed into dry dock, were joined together. The great success of this repair job at the time excited the admiration of the engineering world.

FEED WATER HEATING.

When it is considered that the value of the feed water heater, both as a fuel economizer and a means of insuring the longevity of the boilers, is recognized and appreciated by the owner and engineer, the fact that they can be satisfied with a type of heater which is at best of doubtful efficiency is certainly a matter for comment. Naval architecture, as applied to the design of large freighters such as are now used in the lake trade, has reached a very high degree of efficiency in most details. The design of both hull and machinery has been practically standardized, so that the purchaser has merely to say to the ship builder: "Build me a 9,000-ton boat," and he will get a first-class carrier built on the usual lines, and feel that the usual satisfactory service will be obtained therefrom. In the standardization, however, there is one unit of the engine and boiler plant that has suffered undeserved neglect, and been overlooked in the march of improvement. The feed water heater has not been modernized.

The heater in general use on the lakes—the straight-tube heater, having steam within the tubes and the feed water surrounding them—is one of the oldest types and cannot be classed, comparatively speaking, an efficient feed water heater. Foremost among its defects may be mentioned the lack of proper means of distributing the feed water around the tubes to obtain the best results. No method of baffling the water in its course through the heater is used, the flow, as a result, being direct from the inlet to the outlet. The water in the line of flow is therefore but indifferently heated, again comparatively speaking, whereas the water not in the line absorbs most of the heat and is practically at a point of stagnation. Another serious defect is the gradual deposit of scale on the tubes; scale for the removal of which no facilities have been provided. This scale accumulation, after a few years' service, becomes a most effective nonconductor of heat, and greatly reduces the efficiency of the straight-tube heater.

The remedy suggested and offered is the multicoil feed water heater. The water passes at a high velocity through small copper coils, being distributed equally throughout, the coils being surrounded by the exhaust steam from the auxiliary machinery. By this method the temperature of the feed water can be maintained at from 210 to 230 Fahr., carrying a slight back pressure in the exhaust steam. Owing to the flexibility of the coils, and the rate of flow of the water through them, the adherence of scale is impossible.

The Griscom-Spencer Co., after careful experimenting on their part, have designed their multicoil feed water heater on this principle, and in ocean practice, where their Reilly multicoil feed water heater is extensively used, have found their product to give highly satisfactory results. They are now prepared to push the use of their heater in the lake trade, and it is hoped and expected that their success in that field will be as marked as it has been in the ocean trade, where Reilly heaters are used not only in commercial practice, but in ships of the United States revenue cutter service, United States lighthouse board, and the department of commerce and labor.

MODERN SEAMANSHIP.

"Modern Seamanship," by Lieut. Commander Austin M. Knight of the United States navy is now in its third edition. This book is well named in that it deals exclusively with modern seamanship. As a rule the many excellent treatises upon the subject deal with seamanship as it has existed for centuries, that is to say, with the sailing ship. There is, of course, need of these treatises, but the fact remains that steamers now carry more than one-half the world's goods, and the time is not far distant when they will carry a far greater proportion, as practically 99 per cent of new construction is steam tonnage. Lieut. Commander Knight's book is really complete, embracing not only all that is necessary to know about the sailing ship but everything that it is necessary to know about the steamer. The book is illustrated with 136 full page plates, illustrating every

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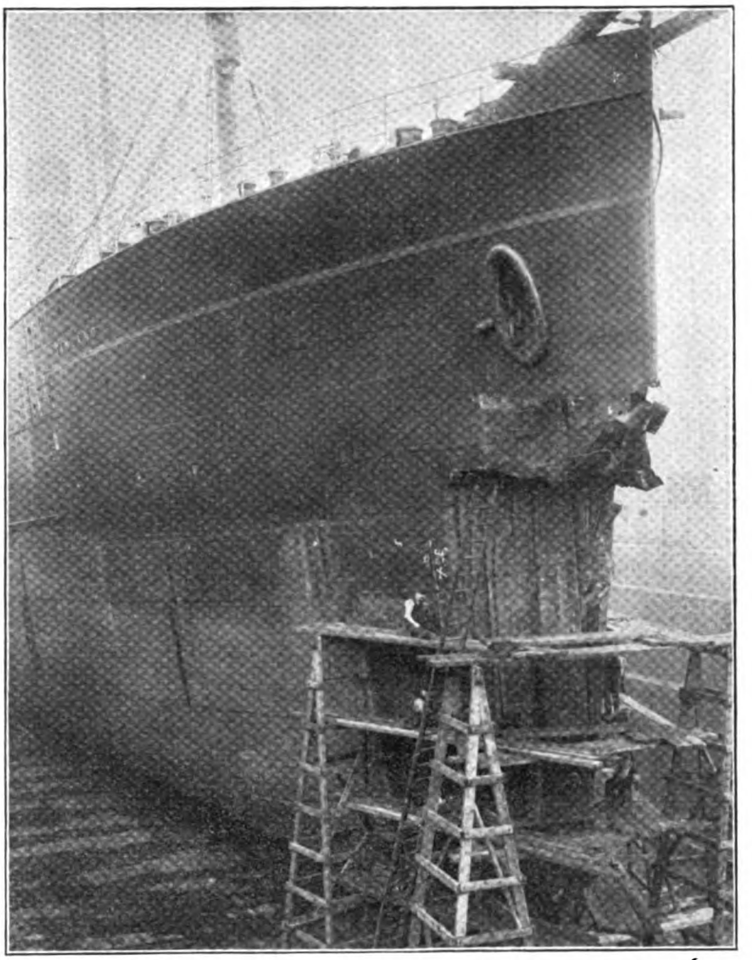
possible part of the ship having to do with seamanship. The illustrations are exclusively in line and are very clearly drawn. In this splendid work there is practically nothing lacking.

The book begins with a description of the hull and fittings of a ship with illustrations, following with a chapter on knotting and splicing, chapter on spars and standing rigging, sails and rounding gear, and discussing practically every phase such as the compass, log and lead, the handling of boats in a surf, the handling of steamers, the maneuvering of boats to avoid collision, the rules of the road, handling a steamer alongside of dock, placing the ship in dry dock, towing, the work of rescue, stranding, and making and taking in sail. No library on seamanship is complete without this work. The price is $6. It is for sale by the MARINE REVIEW.

SOME INTERESTING FACTS ABOUT THE WHITE STAR LINE.

The year 1907 has been one of such supreme importance in the annals of the White Star line that a brief account of the various alterations in its services will provide interesting reading. Up to some 10 or 15 years ago, London was the main objective of the American tourist, and the New York-Liverpool service of the company then admirably served every need of the traveler. But time effects many changes, and of recent years the trend of American travel has been directed to an almost equal extent toward Paris, with the result that such passengers as desired to visit the continent of Europe in the first instance, demurred to the necessity of crossing the channel after landing in England. It was to meet the requirements of these that after mature consideration the White Star company decided to remove its Royal and United States mail service from Liverpool to Southampton, thus affording its patrons the opportunity of disembarking either at a French or English channel port. The new service was happily inaugurated by the despatch of the new Adriatic, 25,000 tons, (the largest of all British twin-screw steamers, and replete with many innovations) which sailed from Southampton on June 5, and throughout the year the support given to the company under this change has been of a most gratifying character concurrently with the transfer of the Wednesday mail service to Southampton. The White Star line altered the sailing day of the Friday Liverpool steamers to Thursday, and since the alteration the four great liners maintaining this latter service, namely, the Baltic, Cedric, Celtic and Arabic, the first three



CRUSHED BOW OF THE RED STAR LINER FINLAND.

of which are considerably over 20,000 tons gross register, have been so handsomely patronized by the traveling public that it is evident there is ample room for the two services. The White Star line's operations now consist of the following: Southampton-Cherbourg-New York via Queenstown (westward) and Plymouth (eastbound); Liverpool-New York via Queenstown; Liverpool-Boston via Queenstown; Liverpool-Cape Town-Australia; London-Cape Town-New Zealand; New York-Mediterranean (via Azores); Boston-Mediterranean (via Azores); Liverpool-New York (cargo only); Liverpool-Australia (cargo only); Liverpool-New Zealand (cargo only). Perhaps particular reference should be made to the Mediterranean services. The White Star line is the only company dispatching steamers from both New York and Boston to Mediterranean ports, and in addition to the regular steamers maintaining this trade, the Cedric, 21,000 tons, is being employed this winter, her extroadinary success last year making it apparent that there is a special demand for this favorite vessel. The following are some interesting facts concerning the White Star line: All its steamers are provided with twin screws; the average tonnage of the steamers is by far the largest in the world; the Republic is the largest and fastest steamer in the Boston trade; its Australian steamers are the largest dispatched from the United Kingdom; its New Zealand steamers are the largest in the trade; wireless telegraphy and submarine signaling apparatus are installed on its principal steamers, and skilled orchestras are carried on all its American steamers. During the last 30 years the managers of this famous line have likewise been the first to introduce the following innovations: The adoption of electric bells on board ship; the provision of separate chairs for each passenger; first to adopt Maury's Lane route; to adopt overlapping twin-screw propellers; to supply third-class passengers with cooking and eating utensils, and bedding; to introduce lounges (saloon on the Republic and second cabin on the Adriatic); the first to introduce Hebrew and Scandinavian cooks for third-class passengers, and the first to supply an elaborate system of Turkish baths for first-class passengers.

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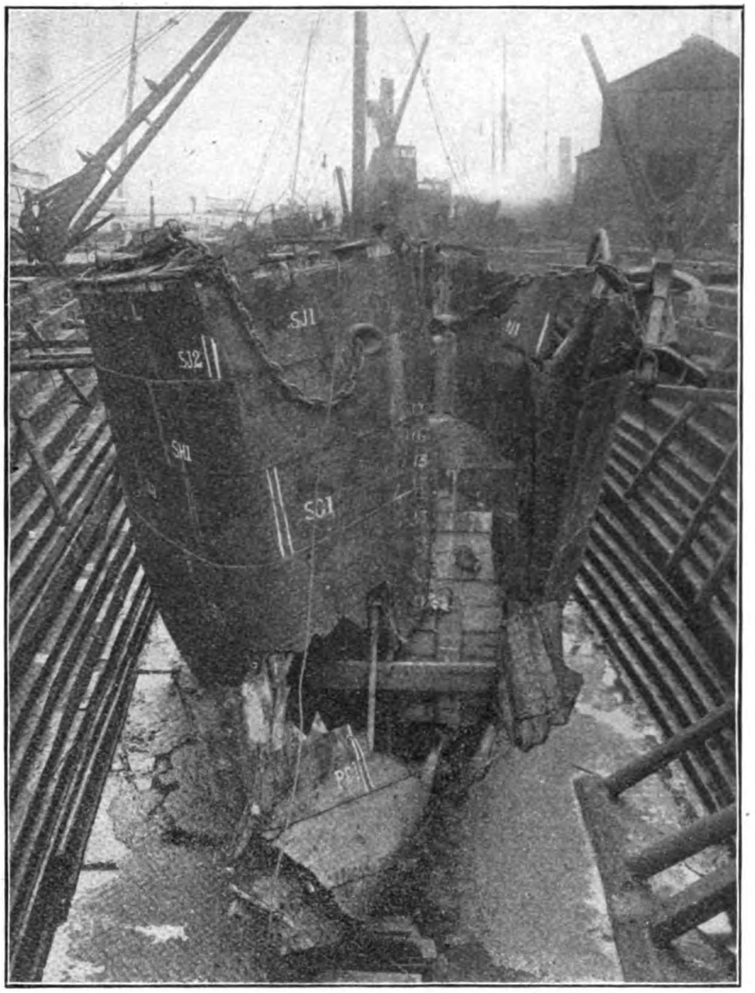

COLLIER VAUXHAULL—SHOWING DAMAGED BOW.

THE CLOCK OF THE EMPRESS OF IRELAND.

Many marine men recall the entry into service of the Canadian Pacific's splendid steamer Empress of Ireland, but probably few of them are aware of a little incident that reflects to the credit of the patriotic Irishmen of

THE CLOCK OF THE EMPRESS OF IRELAND.

Canada and bestows honor on their worthy countryman, Sir Thomas Shaughnessy, president of the Canadian Pacific Railway.

The accompanying cut is a good picture of a handsome clock which thousands of persons have admired ever since it has graced the palatial interior of the handsome vessel. On the base of the clock is a plate bearing the following inscription, which tells the whole story briefly and more impressively than pages of eulogy. It reads:

Presented to

R. M. S. Empress of Ireland
By Irishmen of the cities of Quebec, Montreal, Ottawa and Toronto.
A Token of esteem to Sir Thomas G. Shaughnessy, President.

The clock is made from one solid piece of Irish bog-oak, is handsomely finished and is hand carved. Encircling the dial, which is 12 inches in diameter, is a wreath of shamrocks. Below the dial, on either side of the base of the clock, are carved Irish harps and wolf hounds. It is an artistic piece of workmanship and the figures embodied in its construction are distinctly symbolic of Ireland. This artistic time-piece is the product of the E. Howard Clock Co., one of the oldest concerns in Boston, Mass., established there over sixty-five years ago. It is said to be the first clock of its kind ever made in this country, and cost several hundred dollars.

CLEVELAND SHIP MASTERS' NEW QUARTERS.

For the past 15 years the Cleveland lodge of the Ship Masters' Association have occupied rooms at No. 122 Water street (1401 West Ninth). Recently, however, the lodge has taken the lease of the fourth floor of the building at the southwest corner of Superior avenue and West Third street, formerly occupied by the Williams & Rodgers Co. This floor is very capacious and will give to the Cleveland lodge the finest quarters of any on the lakes. During the past two years nearly all of the Cleveland vessel owners have joined the Cleveland lodge of the Ship Masters' Association and the rooms will be so designed that in future any large meetings of vessel owners can be held there.

James Wallace, president of the American Ship Building Co., will personally decorate and furnish the rooms for the masters. The assembly room will be 32 ft. wide and 60 ft. deep; the parlor will be 37 ft. by 20 ft. and the library will be of the same dimensions. The billiard room will be 37 ft. long and 37 ft. wide. At its last meeting the Cleveland lodge expressed its appreciation of Mr. Wallace's generosity by the adoption of the following resolution:

"James C. Wallace, president of the American Ship Building Co., having kindly offered to fit up the proposed new rooms to be occupied by our association, we deem it fitting that the following resolution be presented and adopted:

"Resolved, That the members of this association have in mind and in purpose only the elevation of the calling in which we are engaged. We therefore desire the better quarters to which we are about to move, and in accepting the suggestion of Mr. Wallace to assist in this movement by fitting up our rooms, we desire to, and we do record, our hearty appreciation and our thanks."

The navy department has accepted the 17-knot battleship Mississippi from the William Cramp Ship & Engine Building Co., Philadelphia, Pa. The contract price of the Mississippi was $2,999,500 exclusive of armor and armament. The Cramps have a sister ship, the Idaho, now nearing completion.

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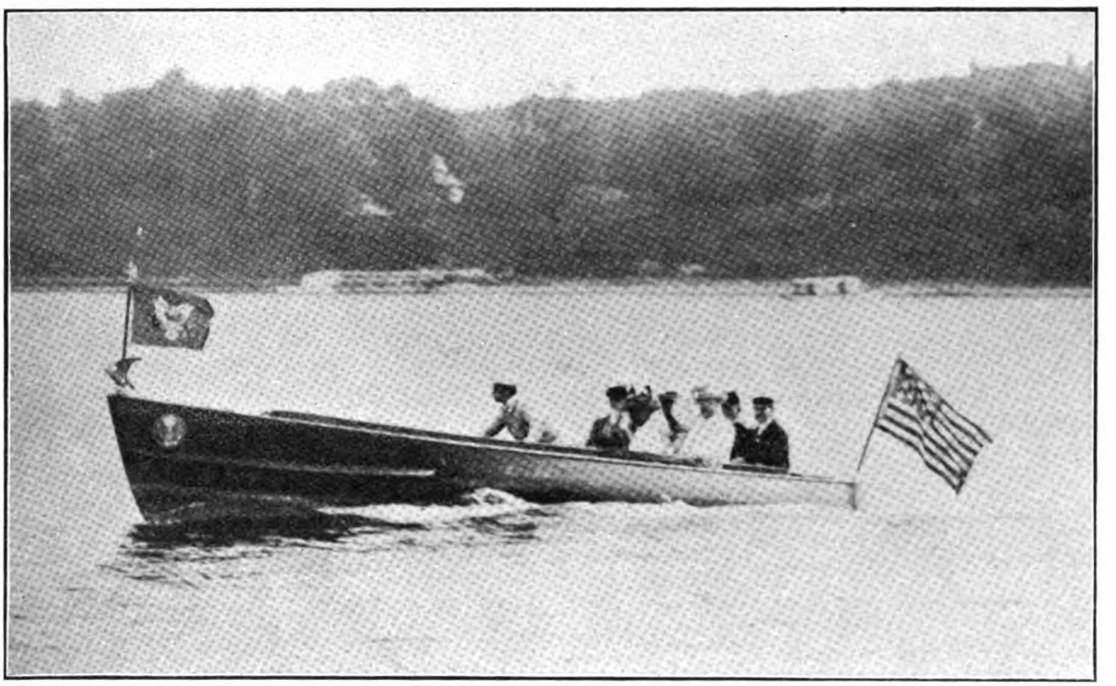
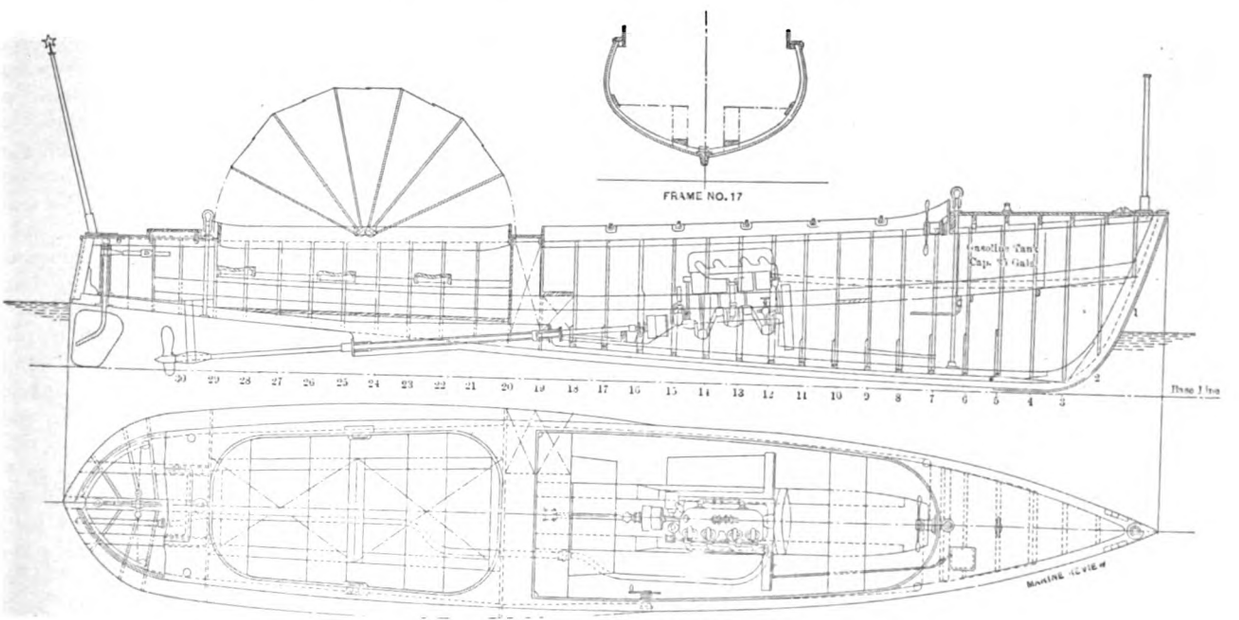
MOTOR BOAT FOR NAVAL SERVICE*

BY NAVAL CONSTRUCTOR L. S. ADAMS.

The Society has already had read before it several interesting papers relative to motor boats, high speed launches, and explosive engines. The subject is, however, one of so much interest and is so important to our navy, where the progress with this type of boat has been slow, that it is believed an additional paper, treating the matter in a different light from the previous ones, will be found to be of considerable interest.



TWENTY-FIVE-FOOT MOTOR BOAT DART WITH PRESIDENT ROOSEVELT ABOARD.



SECTIONAL VIEWS OF 25-FT. GASOLINE LAUNCH DART.

The lack of progress in this matter in the navy appears to be due to a distinct prejudice on the part of most naval officers of carrying gasoline on board ship, on account of its explosive properties, and to the fact that most officers of the navy have but a superficial knowledge of the gasoline engine, believing that the latter is not sufficient'y reliable for naval purposes.

The above appear to be the only objections to the use of motor boats in the navy, and as the writer does

*Read at annual meeting Society of Naval Architects and Marine Engineers, Nov. 21, 1907.

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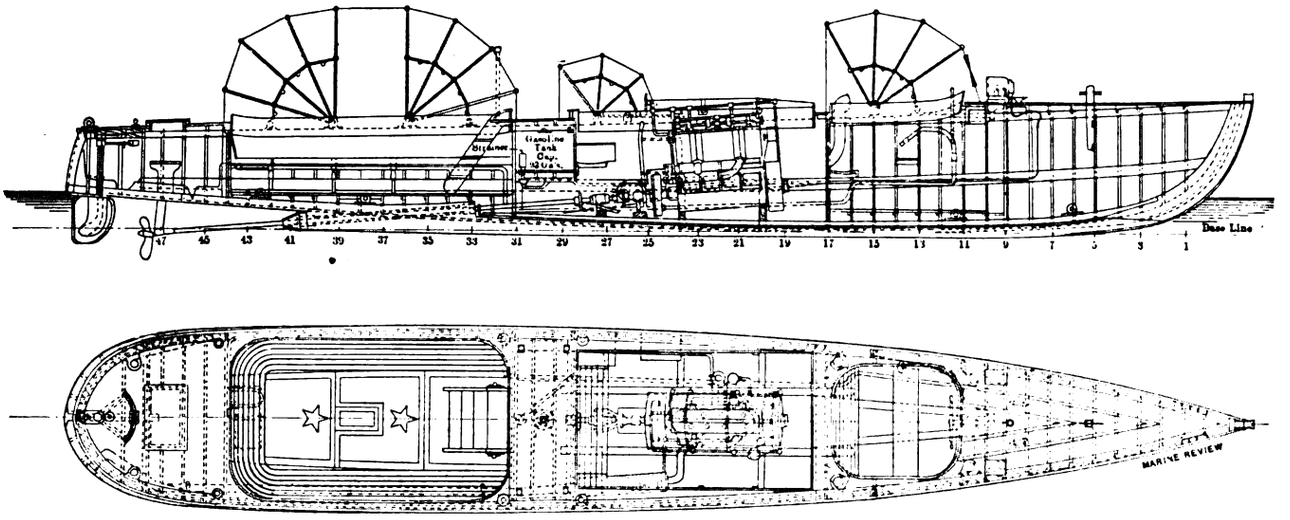
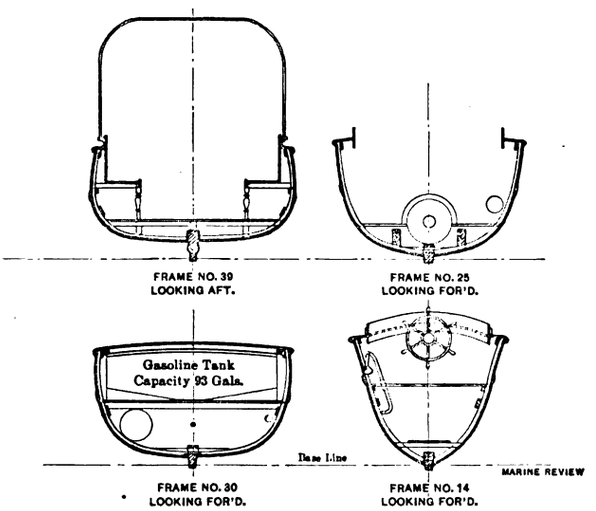


SECTIONAL VIEW OF 40-FT. GASOLINE BARGE.

not agree with the general opinions outlined above, it is considered best to discuss these points in some detail.

It is admitted that gasoline is a dangerous substance and particularly so on a warship, where the fire from an enemy would present a menace, not to be encountered on other types of vessels.

The writer believes, however, that the danger is greatly exaggerated



FORTY-FOOT GASOLINE BARGE.

in the minds of most people. For instance, it seems to be a common belief that a lighted cigar or cigarette will produce an explosion if brought in contact with an explosive mixture of gasoline vapor and air. As a matter of fact, a considerably greater heat, such as that from a flame or a hot spark, is required to produce such an explosion. Moreover, a lighted cigar or cigarette will not ignite liquid gasoline, and if immersed in the latter would be put out. To produce an explosion, there must also be present a mixture of gasoline vapor and air in approximately exact proportions, and in a confined or enclosed space. An explosion cannot be obtained in the open air. The most serious danger on a warship would be from setting the gasoline on fire. Water on such a fire would make matters worse, as liquid gasoline will burn on top of water.

The above well known facts have been cited for the reason that the writer has heard so many erroneous statements made relative to these matters, both in the navy and out of it.

The point now under discussion is: "Can gasoline be carried with safety on warships?"

In this connection it has been suggested that the gasoline be stored in a tank on the weather deck, and this installation has actually been made on at least one large vessel. This is all right in time of peace, but it would be particularly dangerous in time of war, when the enemy's shell might, and probably would, pierce the tank and cause a serious fire. It is evident that the carrying of gasoline on the weather deck is unsafe, as no one can deny that a warship should at all times be fully prepared for war. The writer suggests, as an adequately safe storage on large vessels, that the gasoline be carried in copper tanks located in the trimming tanks of the vessel, the copper tanks to be fitted with filling and suction piping, leading to the weather deck, with suitable stop-valves at the tanks, which valves should be kept closed, except when filling the tanks or pumping out the gasoline. The trimming tanks are of but little use for any other purpose, except to provide a watertight compartment in case of collision or damage. Their value in producing change of trim is so small as to be practically negligible, and, at any rate, the storage of gasoline in them would not prevent their being used for trimming in case of necessity. They are located below the protective deck, and are well below the water-line, and it is believed that the carrying of gasoline in them would provide an arrangement so safe as to silence all objections on this point.

In the case of torpedo-boats and destroyers, I would also suggest the extreme forward compartment for carrying gasoline, similar to the arrangement outlined for larger vessels. In this location it would be farthest removed from danger of ignition or accident from the crew of the boat itself, but it would be exposed to an enemy's fire. The latter would, however, be the case with any location on the boat. If considered too dangerous, the gasoline need not be carried in time of action, and could be

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YEARS.

Supplen

Compiled by THE IRON TRADE REVIEW, Cleveland.

NAME OF MINE.	1907	1896	1897	1898	1899	1900	1901	1902	1903	1904	1905	TOTALS
Mesabi Range												
Adams	1,136,513								1,370			1,370
Adriatic	70,187	110,821	98,847	104,510	93,025	119,940	63,429	110,993	107,886	81,164	138,396	1,353,792
Agnew	149,084	95,809	149,594	286,821	337,807	404,645	477,212	646,203	522,035	374,944	423,698	5,382,941
Ajax (Kanawha)							18,750	100,864	31,901	16,577		311,608
Albany	437,521						17,326	64,664	123,236	151,114	133,246	865,200
Alberta	31,032										16,625	75,425
Alexander	120,382				80,915	51,639	36,598	129,035	246,581	132,420	210,388	1,598,242
Auburn												67,419
Bessemer	78,012								2,088	4,242	10,248	236,320
Biwabik	803,750	420,318	643,402	724,768	940,513	929,937	929,701	956,812	704,051	541,324	902,628	15,208,149
Brunt	178,935											14,883
Burt	1,501,272	87,202	24,623	14,199	126,290	97,531	19,963	186,798			27,883	942,703
Canisteo	5,454	93,707	98,283	250,687	117,296	53,342	77,799	112,704	5,051	1,617	8,085	2,460,947
Canton		44,526	95,210	123,233	147,346	197,770	230,614	195,555	117,096	180,983	152,255	1,733,569
Cass	38,121				20,210	38,209						58,419
Chisholm	258,793	3,396	41,942	76,877	100,902	141,148	178,800	183,052	111,851			837,967
Cincinnati	6,369			5,009	10,980	49,203						165,550
Clark	319,983	47,081	31,062	49,381	7,458			2,816	5,366		21,051	1,319,646
Columbia											1,819	18,719
Commodore	477,203					1,316		10,382	9,86	11,257	11,973	871,259
Corsica	172,226	35,136	37,594	93,663	74,235	35,756	15,396	130,798	95,87	153,452	233,858	2,346,474
Crosby	227,265											7,949
Croxton	34,853									11,988		11,988
Cyprus	260,948							14,455	61,694	132,380	77,370	405,864
Day		14,643		33,851	43,316	98,550	123,261	42,470	100,751	68,318	191,265	1,635,235
Diamond	171						11,444	7,599	1,294	4,737		40,036
Duluth	93,120	94,645	96,032	69,865	110,269	72,413	149,966	123,331	79,420	136,282	124,450	1,393,503
Elba	134,488					11,008	20,355	74,596	53,825	38,288	9,704	210,683
Fayal	1,878,812				3,496	6,410	2,503					20,229
Forest	4,840											6,371
Fowler	34 014							3,373	7,339			28,540
Franklin	30,926											2,360
Frantz	907				4,900							93,101
Genoa	108,610											16,224
					67,652	31,323		47,267	43,736	29,393	74,991	566,341
					43,622	72,959	19,727	7,747	15,606	17,577	19,539	238,950

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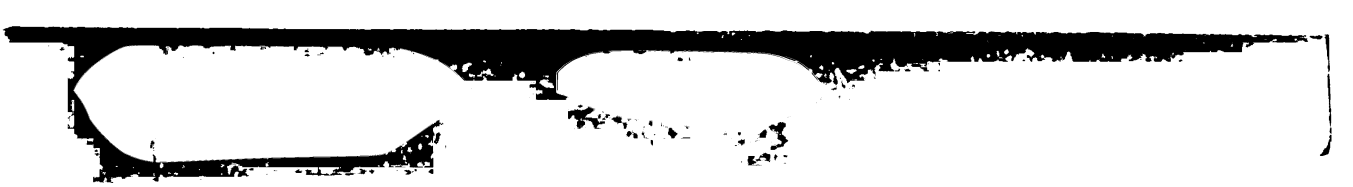

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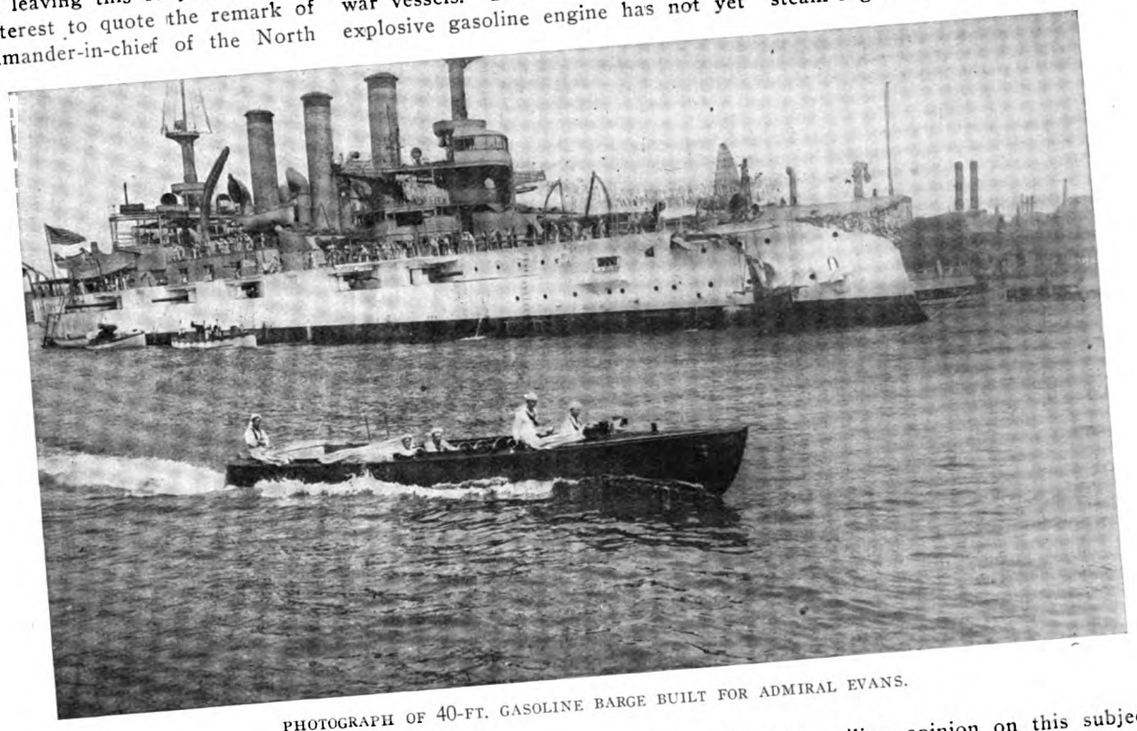
obtained as necessary from one of the larger vessels of the fleet.

Before leaving this subject it might be of interest to quote the remark of the commander-in-chief of the North Atlantic fleet when the subject of carrying gasoline boats on warships was taken up with him. It was to the effect that there were already so many explosives on the vessels, worse than gasoline, that he did not object to carrying one more.

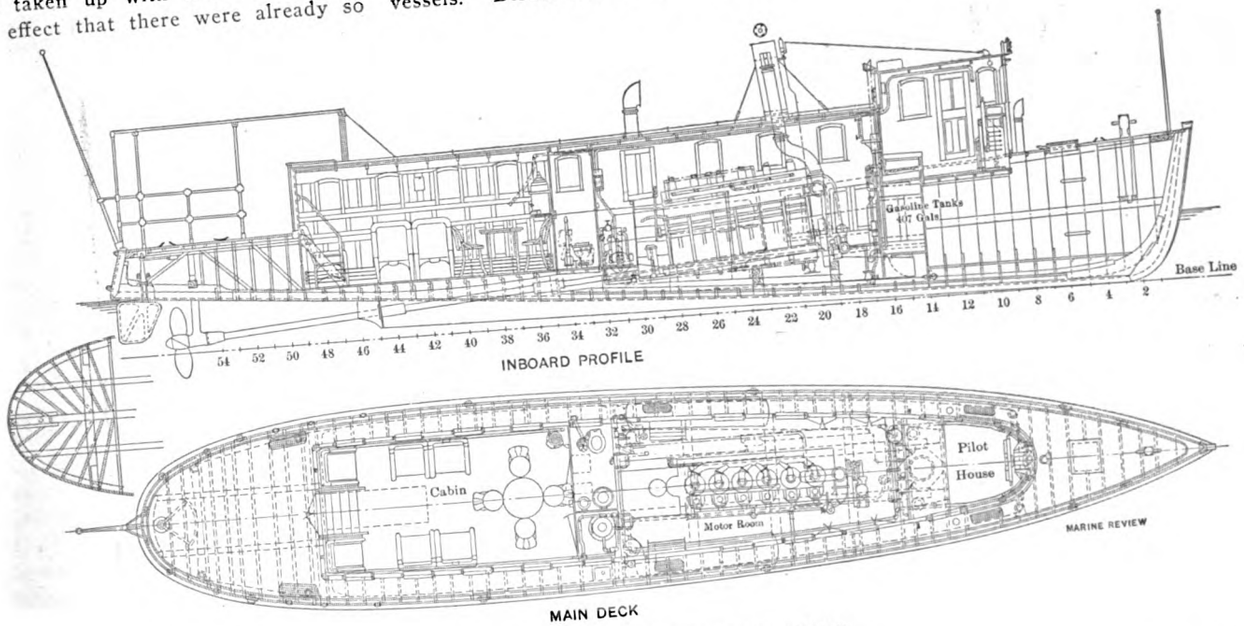
The foregoing remarks apply only to carrying gasoline in limited quantities for the use of small boats and are not intended to apply to the carrying of large quantities of gasoline for running the main engines of war vessels. The development of the explosive gasoline engine has not yet reached the stage where it is evident that this engine is applicable to the higher powers necessary for larger vessels. Discussion of this part of the subject will therefore be left to the future.

It is believed that the development of a satisfactory and efficient explosive alcohol engine is near at hand. This, if accomplished, will very materially reduce the danger from the explosive fuel.

As regards the reliability of the gasoline engine compared to the steam-engine it appears that the prevailing opinion on this subject which is adverse to the gasoline engine, is based on experience with automobiles and with the thousands of small gasoline boats in use generally for both pleasure and commercial purposes. It must be admitted that such experience does not show the gasoline engine in a very favorable light. The reasons for such apparent unreliability



PHOTOGRAPH OF 40-FT. GASOLINE BARGE BUILT FOR ADMIRAL EVANS.


Gasoline Tanks
407 Gals.
Base Line
54 52 50 48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 8 6 4 2
INBOARD PROFILE
Cabin
Motor Room
Pilot
House
MARINE REVIEW
MAIN DECK

SECTIONAL VIEWS OF 60-FT. GASOLINE LAUNCH.

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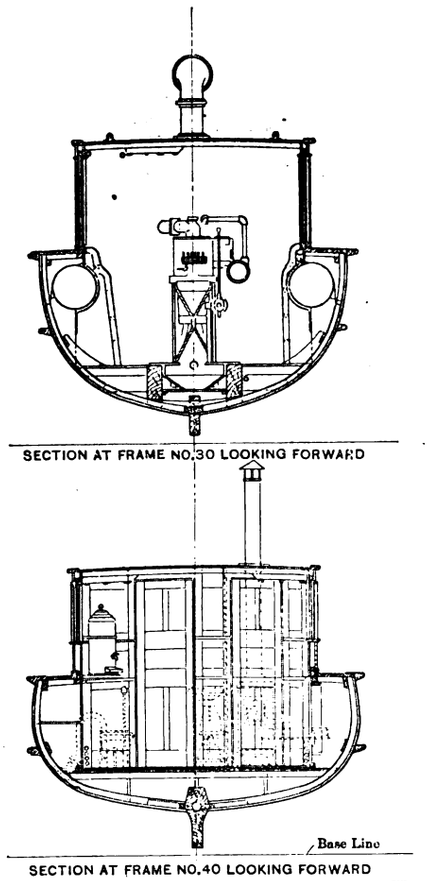
are not hard to find. It is conceded that the gasoline engine is more delicate in adjustment and is more liable to puzzling troubles than the steam engine, and it is generally more complicated and more difficult to operate. In spite of this it is found that a large majority of automobiles and small gasoline boats are operated by persons having but little knowledge



SIXTY-FOOT GASOLINE LAUNCH.

of the engines and principles of operation, and who are almost absolutely at a loss when anything goes wrong or gets out of order. No license requiring a test of competency is required to operate either a motor boat or an automobile, whereas, on the other hand, a steam-engine can be operated only by a licensed engineer who has proved his fitness for the work. In view of this, is there any wonder that gasoline engines are generally supposed to be unreliable by persons that do not thoroughly understand them. It seems to be the prevailing opinion that anyone can run a gasoline engine, whereas, as a matter of fact, more intelligent care is necessary than with a steam engine. With the latter, as long as there is steam and enough oil, the engine will run, unless something is radically wrong. With the gasoline engine, there are—

First. A complicated ignition system, which unless thoroughly understood and properly cared for will surely give trouble, which generally results in the sudden stopping of explosions in one or more cylinders or failure of the engine to start, both of which require a more or less lengthy hunt to find the trouble.

Second. The carburetor, or apparatus for converting the liquid gasoline into an explosive mixture, which must also be thoroughly understood and which if not handled properly can cause numerous troubles, including failure of the engine to start.

Third. The oiling system which requires the greatest of care in its adjustment and operation, as too much as well as too little oil in the cylinders will produce trouble.

It is thus evident that the gasoline engine with its several delicate and complicated systems cannot be expected to be as certain in its action as a steam engine, particularly so when in the hands of one that does not thoroughly understand it. The inferiority of the gasoline engine in this respect, is not, however, as marked as generally supposed, and the writer maintains that in the hands of a man specially educated for the work, a gasoline engine is sufficiently reliable for naval use. This opinion is based largely upon the writer's own experience of several years in running gasoline engines, of various makes, both in boats and automobiles, and it is strengthened by observation of the large number of gasoline launches in successful commercial use and particularly those in use by fishermen, which latter are taken miles from shore with comparatively little trouble, even though handled by men who as a rule are not experts in the operation of gasoline engines. Such men, depending on their boats for a living, could not afford to operate an unreliable engine.

There are, of course, many poor engines on the market which tend to decrease faith in the reliability of the gasoline engine as a class, but there are also many excellent ones that will operate satisfactorily.

Having now discussed the principal objections to the use of motor boats for the navy, the advantages in their favor will be considered. These are as follows:

(A) REDUCTION IN WEIGHT.

Probably the steam engine alone is somewhat lighter than the gasoline engine, but when the total installation, including the boiler is considered, the advantage is very materially in favor of the gasoline engine. This saving of weight is the greatest advantage possessed by the gasoline engine and is a very important factor in the design of any type of boat. A reduction in machinery weights will permit a corresponding increase in carrying capacity, or a modification in the form of the boat, where the machinery weight is excessive, which will provide a faster and more seaworthy boat of less displacement.

This advantage is all the more marked by the lowering of the center of gravity of the machinery as a whole, due to the removal of the heavy boiler with its high center of gravity.

As an example of what can be accomplished in this line, let us consider one of our standard 40-ft. steam cutters. These boats have a total normal displacement of about 19,680 lbs., of which about 8,780 lbs. is taken up by the machinery, coal and water. No proof is needed to show that such a displacement is excessive for the length and can only result in a heavy, clumsy boat, of low speed, and of doubtful seaworthiness when loaded. The displacement given above includes a crew of six men only, but the maximum carrying capacity of the boat is supposed to be 60 men. Personally I should not care to go in this boat with even half this load in anything but a moderately smooth sea. This steam cutter is fitted with a machinery installation of about 48 I. H. P. at 160 lbs. of steam, and the engines makes about 320 R. P. M., which produces a speed of only about 8.76 knots. Some time before this speed is reached the speed-power curve turns sharply up, and the last knot or so requires an altogether excessive increase in the power.

The navy has had years of experience with this type of boat and it has been found inadvisable to install lighter steam machinery as it will not satisfactorily stand the rough usage to which it is necessarily subjected in the naval service. In fact the latest tendency is to still further increase the machinery weights in all our steam cutters. This is going to make the conditions still worse.

Let us now see what can be accomplished by the installation of a gasoline engine in the 40-ft. steam cutter. It is found that a 40-B. H. P. gasoline engine, which corresponds approximately to the 48-I. H. P. steam engine, can be obtained at a weight of certainly not more than 3,000 lbs. for the total installation,

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and about 350 lbs. of gasoline would be the total weight of fuel necessary. This is on the basis of a heavy substantial engine turning about 350 R. P. M., which would be suitable for the rough usage incident to naval service. A very much lighter engine could of course be obtained but would hardly be suitable for a working boat in almost constant use.

We find, then, that the total weight of the gasoline installation is about 3,350 lbs., as against 8,780 lbs. for a steam installation of the same power, which results in a saving of 5,430 lbs., or the equivalent in weight of about 36 men. Deduct this weight from the present 40-ft. steam cutter and it is at once evident that a faster and more seaworthy boat is obtained with, at the same time, a very much larger carrying capacity.

Considerable improvement would be the result in the present steam cutters, if gasoline engines were placed in the boats as they now are. This would cause a reduction in draught of about 4½ in., but this would not have any serious effect on the immersion of the propeller as a screw smaller in diameter would be necessary on account of the increased speed without increase in power. Much more satisfactory and efficient boats could, however, be obtained by designing the hulls specially to accommodate the gasoline engines and the reduced displacement.

Another striking example of what can be accomplished by the installation of a gasoline engine is furnished by the 28-ft. steam cutter. As originally designed this boat had a total displacement of 10,430 lbs., of which 4,027 lbs. was devoted to machinery, coal and water. It was found that the stability of the 28-ft. steam cutter was not entirely satisfactory and designs have been prepared for a new hull to provide greater stability. Two designs were submitted, one of which provided for increasing the beam of the boat, but retaining the same general form; the other contemplated an entirely different form of hull. It has, however, been decided to increase the machinery weights in the 28-ft. steam cutters and the latest machinery weighs 6,384 lbs. With this excessive machinery weight, it is practically an impossibility to obtain a satisfactory design. The installation of a gasoline engine would solve the problem.

(B) REDUCTION IN COST OF MAINTENANCE.

While the steam engine is more free from possible troubles in running than the gasoline engine, it is not believed that there will be any appreciable difference in the long run in the cost of repairs. The troubles of the gasoline engine in running are as a rule of a minor character, requiring only sufficient knowledge to correct and very little actual work. Both engines require periodical repairs, but with the gasoline engine, when the repairs to the engine itself are done, that is the end of the job. With the steam installation we have, in addition, the cost of maintenance and repairs to the boiler, which is a large factor in the total cost of maintenance. In fact, the boiler is the most troublesome as well as the most dangerous part of the machinery, and its omission in the gasoline installation is an advantage that must be apparent to anyone, not only on account of reduction in cost of repairs but also for the reason that its troubles and dangers are entirely abolished.

While on this subject it may be well to discuss also the cost of operation.

In this connection it is well known that the cost of fuel for operating a steam engine is considerably less than that for a gasoline engine of the same power. On the other hand, the steam installation is burning fuel when the engine is at rest, and also when getting up steam, which is not the case with the gasoline engine. The latter does away with the necessity for a fireman, and also on account of its reduction in weight it will drive the boat faster, or the same speed may be obtained with an engine of less power, with a correspondingly smaller fuel consumption. It is not considered worth while to produce actual figures to compare operating expenses as no two boats run under the same conditions, and the figures that would apply to one boat might be greatly in error for another. The writer will state, however, that in a certain case where a gasoline launch had been substituted for a steam launch used for ferry service, he made a careful comparison of operating expenses which showed that there was little if any difference in cost of operation when the boats were run at the same speed.

Even if the gasoline engine were found to be more expensive to operate, it is believed that the increased cost of operation would be more than offset by the large reduction in cost of maintenance.

The above remarks relative to operating expenses do not apply to producer gas plants, which I understand are very much cheaper to operate. I have, however, had no experience with the latter and as far as I am aware they have not yet been perfected, and there are none in successful operation for marine purposes in this country.

(C) SAVING IN SPACE.

This varies with different makes of engines but may be safely counted upon as being twenty (20) to twenty-five (25) per cent in length.

(D) READINESS TO START.

The gasoline engine is always ready to start at its maximum power at a moment's notice, and no time is lost getting up steam. In time of war this might prove to be of the utmost importance.

(E) LACK OF FLAME FROM THE SMOKE STACK.

This is, of course, entirely absent with a gasoline engine. With a steam engine it would disclose the presence of the boat at night to an enemy.

The above comprise the main advantages of the gasoline engine over the steam engine and the question now is. "Are they sufficient to counteract the real or fancied advantages outlined at the beginning of this paper?" It is believed that the answer to this question can be only in the affirmative.

The aim of our navy should always be the greatest possible efficiency in every respect, and advantage should be taken of each new development, no matter how small. The boats carried by our ships are of course only a very small part of the navy, but they are at the same time an important part and, if their efficiency and usefulness can be increased, it will add also to the efficiency of the ship as a whole.

While our navy has taken up this subject to a certain extent and has installed gasoline engines in a few small boats, still the progress made in this respect has been slow and it is not believed that the subject has been given as much careful consideration as it is entitled to. Some foreign governments are undoubtedly ahead of us in this matter.

The writer believes that, first of all, gasoline engines should be installed in all the present steam launches, and that, in future construction, the hulls should be altered to provide the better boats made possible by the installation of lighter machinery. Also it would appear advantageous to install a gasoline engine in every whaleboat, cutter and sailing launch. The engines of the necessary power for these boats would be so small that they would not present any material

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interference in rowing these boats when it was so desired. This would leave the men required to row the boats available for more important work. Different designs for these boats might also be found desirable after suitable experience.

In addition to this it is believed that every large vessel should carry one light seaworthy boat of comparatively high speed, for picket and other similar duty.

At the start it would be best to install various commercial engines of known merit, but after suitable experience had been obtained, the navy should manufacture its own engines.

The writer is confident that this change would meet with success if properly carried out. The main troubles at the outset would probably be caused by lack of experience and knowledge in handling the engines, and it should be distinctly borne in mind that much trouble must be expected unless a careful and thorough course of training be first provided for the men that are to handle the engines.

Many will, no doubt, consider these changes too radical to be made as a whole at the outset, but it will certainly be of ultimate advantage to experiment further along these lines, and to make at least a few experimental gasoline installations, particularly in steam cutters.

In regard to the type of engine to be installed it appears that the four-cycle is more suitable, except, perhaps, for the very smallest powers. This is not only on account of its greater economy in fuel, but also for the reason that the two-cycle engine cannot be sufficiently muffled without excessive loss of power and, under some conditions, noise might be a serious disadvantage. In regard to the type of ignition, I am forced to the conclusion that the only suitable system for marine work is the make and break, on account of its superior reliability. The jump spark may be satisfactory in an automobile where the wiring can be kept reasonably dry, but in a boat, dampness and flying spray are unavoidable and the jump spark is too liable to give trouble. This is particularly the case if a single coil and distributing timer be used in a multiple cylinder engine, these being absolutely unsuitable for marine work.

Having now discussed the various sides of the subject, a brief outline of the progress already made by our navy will be given, together with descriptions of some of the boats already built.

As everyone probably knows, all submarine boats are fitted with gasoline engines. These, however, were not designed by the navy department, and a gasoline engine is practically a necessity for this type of boat. Although some of them have been in service for a number of years, we have yet to hear of a gasoline explosion or fire on any of them.

Apart from submarines, probably the first modern motor boat introduced in the navy was the Dart, built at the Norfolk navy yard and fitted with a 25-horsepower Standard four-cylinder automarine engine. This boat is 25 ft. in length over all and 24 ft. in length on the water line, having a maximum breadth on the water line of 4 ft. 3 in. She is of typically speed type, having a flat stern and the maximum draught of water at the bow. She attained a speed on her trials slightly in excess of 17 statute miles per hour, and I am informed that she has since made somewhat more. The hull was not constructed solely for speed but is strongly built, in order to stand the hard knocks incident to naval service. The normal displacement with a crew of three men is 2,250 lbs.

In this connection it must be pointed out that boats built for the navy can never even approach the remarkable speeds attained by boats built specially for racing, as the former must be built strong and comparatively heavy and must have as much carrying capacity as possible. The Dart will safely carry 11 persons. She has the buoyancy forward carried well below the water line and is really a remarkable sea boat for her size. Her bow lifts easily to the seas and she steers remarkably well, even in a following sea. She was built for use as a tender to the United States ship Sylph, and has been in constant service for about 2½ years, and has run many thousand miles. There has been practically no trouble with the engine, which has proved remarkably reliable and is now in as good condition as when it was first installed.

This is an instance of the results that can be obtained if the man running the engine thoroughly understands it. In this particular case it has given better results than a steam installation could have given in the matter of reliability and freedom from repairs. The general arrangement of the boat is given on Plate 1, and a photograph (underway) on Plate 2. The latter shows the president and party on board. From the photograph it will be noted that spray guards are fitted to the sides at the bow. Without these and when under full speed, a considerable amount of spray is thrown into the boat if there is much wind blowing. This is probably due to the full lines forward and to the shape of the bow. This trouble has been overcome in later designs.

Another interesting boat of comparatively high speed is the 40-ft. gasoline barge No. 725, built at the Norfolk navy yard for the use of the commander-in-chief of the north Atlantic fleet. This boat is 40 ft. in length over all, 38 ft. 6 in. in length on the water line, 5 ft. 9 in. maximum beam on the water line, and it has a maximum draught of hull forward of 17 in. The displacement in normal running condition with five men on board is about 6,500 lbs. The motor is a Brownell-Trebert four-cylinder, four-cycle, and is rated at 75 B. H. P. at about 850 R. P. M. The highest revolutions obtained on trial were 771, which gave a corrected speed of 19.28 statute miles per hour. The propeller was not, however, a very efficient one, the apparent slip, which in a boat of this type should not be very different from the real slip, being only 14.8 per cent with a pitch ratio of 1.1. The lines of this boat are very much finer than those of the Dart, and the bow was made a different shape to overcome the trouble from flying spray. The result is a very dry boat, but the form does not produce quite as good a sea boat as that of the Dart, which has considerably more buoyancy below water forward.

Unfortunately, the reliability of this boat has not been satisfactory. This was, no doubt, almost wholly due to the jump spark ignition through a distributing timer, which, as before stated, is unsuitable for marine work. The unsatisfactory experience with this led to the substitution of an individual coil for each cylinder and a commutator which it is understood has proved more satisfactory but is still not sufficiently reliable. The general arrangement of this boat is shown on Plate 3 and photographs at full speed are shown on Plate 4.

Sixty-foot gasoline launch No. 707 is still another type of boat built at the Norfolk navy yard. The general arrangement is shown on Plate 5, and photographs are shown on Plate 6. This boat is of the same general form as the Dart but very much larger. She is 61 ft. 3 in. in length over all, 60 ft. long on the water line, 10 ft. 11 in. maximum beam on the water line, and the maximum draught of the hull forward is 3 ft. 10 in. The normal displacement is 19 tons. This boat was built for ferry service between Washington, D. C., and the naval proving ground at Indian Head, Md. The motor is a four-cycle, six-cylinder standard engine, rated at 300 brake H. P. at 300 R. P. M. It is started and reversed by compressed air. This boat has not been altogether satisfactory on account of the excessive weight of the machinery. The catalog weight of the engine was 6,600 lbs., but this appears to have been without the fly-wheel and other important parts. The designer of the hull was informed that the total machinery

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weights would be 9,000 lbs. The hull was designed and built on this basis. It was then found that the engine alone weighed more than this, and the total machinery weights were 13,331 lbs. This resulted in sinking the boat considerably below her designed water line and in trimming her about 8 in. by the head. This, of course, reduced the speed considerably below that for which the boat was designed and rendered her less seaworthy.

The speed obtained on trial was 19.06 statute miles per hour. In spite of her being so much down by the head, the boat proved very seaworthy when tried in rough water in Hampton Roads, and was at all times under excellent control.

The introduction of compressed air for starting and reversing seems to be practically a necessity for an engine of this weight. It increases the reliability of the engine in starting, but it has the disadvantage that the air supply is limited and may give out completely when handling the boat in tight places where frequent stopping or reversing is required. This actually happened during the trials when attempting to turn the boat in a narrow slip. Also one long blast of the whistle is sufficient to seriously deplete the air supply.

The engine for this boat is a comparatively slow-moving, heavy one, built for constant service, but it is nevertheless considerably lighter than a reliable high-speed steam installation of the same power would be. Take, for example, the Japanese vidette boats, fitted with steam installations of 300 I. H. P. at 550 R. P. M. The machinery in these boats weighs about 8.7 tons, and it is not believed to be as reliable as the slower moving gasoline engine.

The above are probably the most important gasoline boats built for the navy, but in addition to them there have been a few other special boats built; a 10-H. P. gasoline engine has been installed in a 28-ft. whaleback, small power dories have been furnished some of the torpedo boat destroyers, and a trial installation of a 7-H. P. gasoline engine in a 33-ft. sailing launch is being made.

It is understood that the power whaleboat has given good and satisfactory service, although some difficulty was experienced with the engine at the outset. While the form of the whaleboat is an excellent one for pulling in rough water, the speed under this condition being necessarily slow, this type of boat is not well suited to being driven under power through a rough sea of short, steep waves. If it attempted to drive the boat through such a sea at any but the slowest speed, the bow is thrown high in the air and then falls hard, sometimes on a crest and sometimes in a hollow. The result is that quantities of spray and even solid water are thrown in every direction, and if there happens to be at the same time much wind, the spray and water are blown into the boat in sufficient quantities to swamp the latter in a short time. In other words, the whaleboat form is a good sea boat for pulling, but is not a good sea boat for being driven under power. It would, therefore, appear best to experiment with other forms, and it is certain that a better one for this purpose can be designed.

These remarks apply also to the motor dories which have a form of the same general character as the whaleboat. The dories are not by any means ideal sea boats, but they have proved of great service to the torpedo boat destroyers, where a power boat is of particular value on account of the small crew. The dories so far supplied have been commercial boats manufactured by various firms, and are from 18 to 20 ft. in length, with from 2½ to 4-H. P. engines. The writer considers them too small and of too little power as one of their chief duties is towing other boats, and they are neither large enough nor powerful enough to satisfactorily perform this work, especially in a strong tide. It is believed that considerably better results could be obtained by a boat of about 22 ft. in length, of a more suitable form and fitted with a light-weight engine, of 8 or 10 H. P. Such a boat would not be too heavy to be carried on a torpedo boat destroyer.

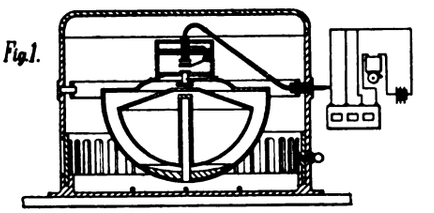
Although this paper is intended to apply, primarily, to the introduction of motor boats into the naval service, and to gasoline engines of the lower powers, such as those in successful operation at the present time, it will no doubt be of interest to the society to describe, briefly, a proposed gasoline installation of much greater power. The Standard Motor Construction Co. has recently made a proposition to furnish a double-acting gasoline engine of 1,200 H. P., consisting of two units, of 600 H. P. each, coupled together, to be installed in the torpedo boat Mackenzie. This machinery will weigh about 10 tons less than the present steam equipment of 850 I. H. P., and there will be a further saving of about 6 tons in the weight of fuel. The present machinery weighs 29 tons, so that it is at once apparent what a proportionally large saving in weight will result from the substitution of the gasoline equipment. This fact alone makes the proposion worthy of the most serious consideration, not so much for any improvement that will result to the Mackenzie, as for the experience that will be gained from such an installation in connection with future designs, where the possibilities for improvement in the boat as a whole are greater.

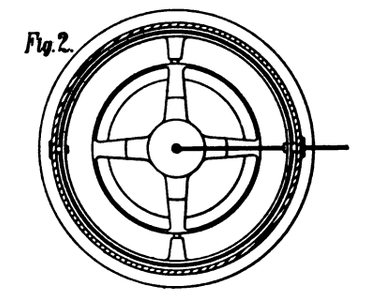
On the other hand, it is believed to be an open question whether a gasoline installation of this magnitude can be made sufficiently safe. The danger of destruction of the boat from explosion or fire from an enemy's shell is great and may be considered by some sufficient to render the installation inadvisable. In order to overcome this as far as practicable the gasoline tanks should be located low in the boat, and protected by light armor, and the gasoline piping also should be carefully protected from possible damage from shell fire.

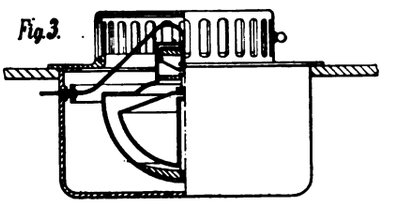
At any rate, if it is assured that an engine of this power is practicable and is not merely in the experimental stage, there can be no doubt of the advisability of proceeding with such an installation as soon as possible in order to obtain valuable experience for use in future designs, whether such experience prove favorable or not to the gasoline engine.

AUTOMATIC LEAK-INDICATOR FOR SHIPS.

The accompanying drawings illustrate a new automatic leak-indicator







for ships, of which the following is a brief description:

Figs. 1 and 2 show the first form in vertical section and part sectional plan respectively, Fig. 3 showing the second form, with the right half of the figure in side elevation and the left side in vertical section. In general

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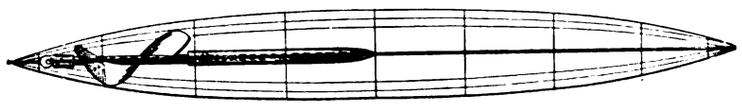
the apparatus consists of a casing provided at its lower or upper part with a series of slots, a slotted ring, revolubly supported and having a screwed knob passing through the outer casing, being in the interior of this casing. A slotted basket is suspended in the center of the casing in which a float is arranged, the float being free to rise or fall on a guide attached to the basket. The basket is weighted at its base with lead, and is so suspended that it will not follow the oscillatory movement of the ship, but always retain its vertical position.

FIG.1.

FIG.2.



The basket terminates in a receptacle provided with two electric contacts, the contacts being attached to insulated conductors; the conductors are united to form a cable, and pass through the casing to an alarm device arranged in a suitable place on the ship. In case the ship springs a leak and the lowest part where the apparatus has been set up is flooded with water, the water penetrates through the slots in the casing to the interior, raises the float, and by forcing the contact closes the circuit and sets the alarm device in motion.

In case the portion of the ship in which the apparatus is arranged is to be cleaned, the slotted ring is shifted by means of the knob in such way that the slots in the outer casing are closed. Several such apparatuses may be arranged at different parts on the ship, and the alarms mounted at one center.

The indicator is the invention of C. Bergstrom, Finland, Russia.

MOTOR BOAT BUOYANCY.

To increase the buoyancy and speed of motor boats is the object of the accompanying design, the invention of Victor M. Salo and John Rukonen, Chicago, Ill.

Built into the body of the boat is a fin keel constructed of thin metal, the bottom edge of which tapers from a point under the bow downward to a horizontal line beneath the propeller and ends with a step for the rudder post. Extending downwards and rearwards from beneath the engine in the forward part of the interior is a propeller shaft tube, the propeller being in an aperture in the keel. The propeller shaft is coupled at the after end of the tube, and is supported in bearings at either end of the propeller. Any form of motor, coupling, or bearings may be used.

GOVERNMENT INSPECTION LAUNCH.

The government has just completed an inspection launch for the use of the United States engineer district in connection with its supervision of the navigable channels of Puget Sound and tributary waters. The boat is a gasoline launch 63 ft. 3 in. long, 12 ft. beam, and draws 4 ft., driven by a 50-H. P. Ralaco four-cycle engine.

The launch is of the cruiser type, with white oak frame and floors and fir planking. A safety acetylene system has been installed for lighting and also for cooking. A 7-in. searchlight is carried on top of the pilot house.

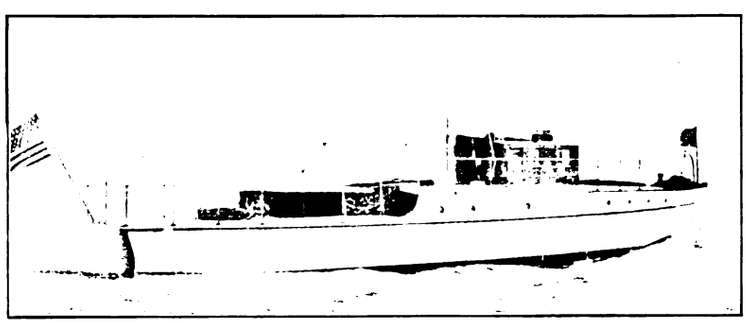
The boat is designed to carry a permanent crew of four persons, but is, of course, capable of carrying a much larger number. It is expected to maintain an average speed of 12 miles, which can be increased to 13 when necessary.

The purpose of the boat is to look after navigation interests upon the sound, so far as obstructions in the navigable waterways are concerned, and to do such incidental survey and errand work as the needs of the local office require. It will be kept continuously in commission. Its principal work will be in connection with fish traps, for which duty the government has heretofore chartered a special boat at heavy expense during the fishing season. It is estimated that the present boat will do this work and a great deal beside, and be continuously available at about half the cost under the previous system.

The operations of the boat will be under the direction of Inspector F. S. Greely. The master of the boat will be George Leighton, recently mate on the Gen. J. M. Wilson. The engineer is J. O. Larsen.

The boat was designed by Lee & Brinton, naval architects of Seattle, and built by James W. Hall, of Eagle Harbor. The engines were built by the Rathbun-Lacy Co., of Toledo, O.

The boat was given her trial trip on Dec. 14, 1907, and is christened the Vigilant.



LAUNCH FOR GOVERNMENT ENGINEER.

It has been authoritatively stated that the new repair yard which is being established on the Elizabeth river, near Norfolk, Va., by Edwin S. Cramp, will be ready for business in about three months. There will be three marine railways, one for the accommodation of vessels up to 2,000 tons, one for vessels up to 800 tons, and one for vessels up to 600 tons. The largest of the three is to be on the order of a dry dock and will be of the most approved modern construction.

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LAKE SHIP YARD METHODS OF STEEL SHIP CONSTRUCTION.

BY ROBERT CURR.

Fig. 20 illustrates one of the two boilers built to supply steam for the Toledo Ship Building Co.'s engine illustrated by Fig. 19. The principal dimensions and data are given in the cut.

The Scotch boiler, while open to many objections, has been in use for marine work so long and so successfully that it has now for itself a practically impregnable position in the estimation of most marine engineers and its adoption by the Toledo Ship Building Co., for this particular power plant is entirely commendable.

The drawing office in an engineering establishment is looked upon in very different ways by different firms and by different departments of the same firm.

By some it is held in high esteem and its instructions carried out without question, while by others it is looked upon as a necessary evil.

The general efficiency of the office itself is usually accountable for the high or low regard in which the office is held.

If the office is up-to-date or a little ahead of time with its work and methods, it commands the respect and confidence of the entire establishment.

The drawing offices of the ship building and engineering plants on the great lakes are certainly of the up-to-date sort.

When the main features of the power plant design for a new ship have been worked out by the chief engineer or the naval architect, the data is turned over to the chief draftsman, who makes an outline drawing first of the engine, and as soon thereafter as possible, of the boiler.

From these general designs the details are then worked out in the proper order, to facilitate construction in the shops.

Drawings for any cast steel parts, such as crank slabs, crossheads, etc., are worked out at once and blue prints passed to the pattern shop.

Steel castings are usually slow in being delivered, hence the pains taken to get the drawings and patterns ready at an early date.

Drawings for the heavy forgings, such as connecting rods, shafting and crank pins, are also prepared at the same time and sent to the forge shop, so that the forgings may be delivered to the machine shop at about the same time as the steel castings.

While the foregoing drawings are being prepared by one set of detail draftsmen, others are at work upon the drawings for the heavy cast iron parts, as the bed plate, frames and cylinders.

These as fast as they are completed are passed to the pattern shop and afford that department work for some time.

Advantage is always taken of any old pattern that may be in stock, and this matter is attended to by members of the drawing room staff.

Coincident with the ordering of the steel castings and heavy forgings is the ordering of the material for the boilers.

Shell and head plates, tubes, stay bars, furnaces, etc., are ordered from the chief draftsman's outline drawing, then the drawing is later filled in and completed by one of the detail men, and blue prints sent to the boiler shop.

Many conferences, between the engineering and hull department drawing offices, are necessary, while the design for the boiler saddles, engine and thrust bearing foundations, etc., are being worked out, in order to avoid costly alterations later on.

The engines and ship must agree one with the other.

The design of the remaining details goes on until all are worked out.

While the detailing is being done the drawings are all carefully checked by the chief draftsman or a regular checker, but, as a further precaution, what is called a general drawing is made up from the detail drawings by a skilled and careful man, who then figuratively assembles the engine in the drawing office.

This method of checking up serves to detect any mistakes that may have escaped the notice of the checker and insures the proper assemblage of the work in the machine shop.

The foregoing order of getting out the drawings usually brings the various parts to the machine shop in the best succession for machining and erecting.

The bed plate, frames and cylinders are among the first parts received, and these are at once machined and made ready for the floor machinists to begin erecting.

While these parts are being machined, the steel castings and heavy forgings usually come in and the crank slabs are then bored and the shafting turned ready to be assembled.

The smaller castings and forgings are coming in all the time at this stage and as fast as the machines can get to them, these parts are made ready for the erecting gang, who fit them in place on the engine.

Before the erecting gang has got very far along, the general drawing of the engine is available for their use and they can go ahead with full confidence that everything has been carefully planned, and that they will not have to tear down any of their work in order to correct mistakes.

The work then goes on smoothly and without friction or interruption until the engine is completed.

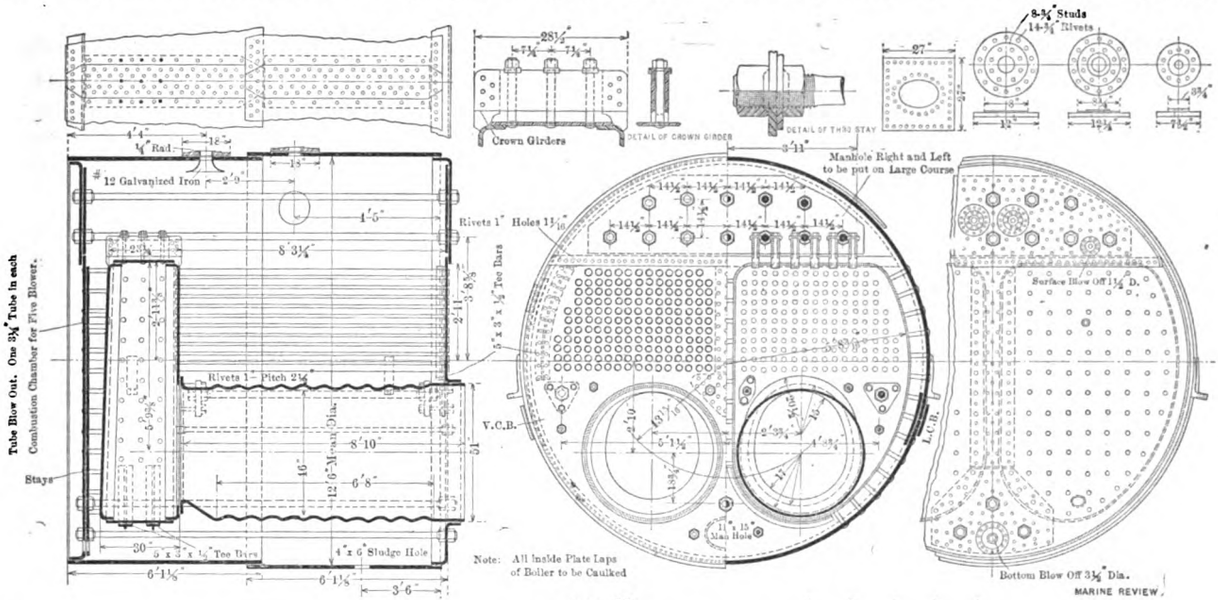
Crown Girders
DETAIL OF CROWN GIRDER
DETAIL OF THRU STAY
8-¾" Studs
14-¾" Rivets
Manhole Right and Left to be put on Large Course
12 Galvanized Iron
Rivets 1" Holes 1 1/16"
Tube Blow Out. One 3¼" Tube in each Combustion Chamber for Five Blower.
Rivets 1" Pitch 2¼"
Stays
V.C.B.
L.C.B.
Surface Blow Off 1½" D.
Bottom Blow Off 3½" Dia.
30 - 5 x 3" x ½" Tee Bars
4" x 6" Sludge Hole
Note: All Inside Plate Laps of Boiler to be Caulked
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FIG. 20.

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February 6, 1908.

ENLARGEMENT OF ERIE CANAL.

F. C. Stevens, superintendent of public works of New York state, has transmitted to the legislature his annual report in which, after giving some few commercial statistics, he reviews the progress of work which he regards as unsatisfactory and states his belief that the general plan of the canal is a mistake. The total tonnage of the year was 3,540,907 tons, valued at $63,903,970. He attributes the slowness of actual work to the following reasons:

First, a lack of sufficient capital by the contractors; second (and this in some cases may be closely allied to the first cause), employment of machinery totally inadequate for the doing of the work in hand; and, third, a knowledge on the part of contractors that since only about 20 per cent of the whole work is under contract, no good reason exists for confining them to their contract periods since, even if completed, the portions of the canal embraced within their contracts could not be utilized until the completion of the whole work.

That the final completion of this improvement is so indefinitely postponed and that the time which, under the most hopeful conditions, must be consumed in bringing it to completion, constitute a distinct and deep disappointment to canal and commercial interests is fully appreciated, and this regret and disappointment are shared in by me.

To my mind the truism that "haste makes waste" was never more aptly applied than it might be in this case. Had the rule "make haste slowly" been applied at the inception of the work, I believe more satisfactory results from every standpoint, would have been secured.

His most important argument, however, is that devoted to the inadequacy of the so-called barge canal which he believes should be transformed into a deep waterway. He advocates a ship canal from the Hudson river to Lake Ontario, saying "Nothing so well illustrates the fact that the lapse of time, in some cases a very short time, changes the aspect of things so far as public improvements go, as does the canal improvement project."

He says that in 1894 the most hopeful of the canal people "had their ambition bounded by a 9-ft. canal." The next project was the 1,000-ton barge canal, but of a different type in many respects from that now undergoing construction since the alignment was different and only 28-ft. locks were provided instead of 45-ft. locks. He commends these changes, but he says "they teach the lesson that in some things at least the barge canal had not been so carefully thought out and its adjustment to the needs of the state so carefully considered as should have been the case."

Had the 9-ft. improvement been completed promptly it would have answered the demands for a time. Had the 1,000-ton barge canal been completed within four or five years as was originally hoped, it would have accomplished temporarily at least the restoration of the state's supremacy, but with the length of construction period involved, as now seems probable, Supt. Stevens fears that upon its completion it will prove a disappointment in that it will not be suited to the commercial demands as they will then exist. He believes the same system should be followed in waterway construction as is followed in the matter of railway building, not for yesterday, today, or even tomorrow, but for the future. "Whenever artificial waterways have been undertaken on any other basis they have proved disappointments." Under this head he speaks of the fact that the Ohio canal has been abandoned; that the Illinois-Mississippi canal just completed after 15 years' labor with 35-ft. locks, is practically obsolete, and that the type of canal in actual use in Canada which closely resembled the proposed barge canal, is already being done away with by the Canadian government. Finally he points out that the Dominion government is planning to build what will constitute a deep waterway, known as the Ottawa-Georgian bay route, connecting Georgian bay with the St. Lawrence river. This will provide the shortest outlet by water for the grain, forest and mining products of the great northwest and he doubts whether, should this be completed, the state with only a 1,000-ton canal could hope to compete with Canada for the great lakes traffic. He thinks that the only hope of restoring to the nation transportation supremacy is to construct a 21-ft. canal between the Hudson river and Lake Ontario on the line of the present barge canal. The federal government made a survey for a deep waterway, 21 ft. deep, in 1900, connecting Lake Erie with tidewaters of the Hudson river, the estimate being $198,000,000 and divided as to that part of the canal connecting Lake Erie with Lake Ontario, $42,500,000; as to that part connecting Lake Ontario with the Hudson river at tidewater by way of the Oswego and Mohawk river route, $155,500,000. The state's share in such a project would not be greater than that which would be expended in completing the 12-ft. canal and the result would be a 21-ft. channel capable of accommodating barges of 8,400 tons instead of craft of only 1,000 tons.

Supt. Stevens is apparently much more sanguine of the practicability of a ship canal connecting the great lakes with tidewater than are many engineers and lake men who have given the subject considerable thought.

Frank S. Gardner, secretary of the board of trade and transportation of New York, does not believe the scheme a practicable one at all. In discussing the matter he said:

A few facts and figures would make such contention untenable. Lake vessels of approximately the tonnage for which a ship canal would have capacity, about 8,000 tons, carry ore and like freight upon the lakes at a cost of 50-100 mills per ton mile under favorable conditions, which latter are a maintained speed of at least 13 knots per hour, a given number of trips per season necessitating the most speedy loading and unloading. A vessel of such dimensions and capacity sailing upon the narrow waters of a canal would be limited to not exceed five knots per hour.

It would therefore, consume 2 3-5 as much time for such vessels to travel upon the canal the same distance as upon the lakes, and as all the costs and charges against the vessel such as interest upon investment, wages of crew, insurance, etc., except fuel consumption, are greater or less according to the time consumed, the cost of transportation in such vessels upon the canal would be approximately 2 3-5 times as much as upon the lakes, or 2 3-5 x 50-100 equals 130-100, or 1 3-10 mills per ton mile. But it has been demonstrated

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that a 1,000-ton barge could carry upon the canal for 52-100 mills per ton mile or 78-100 less than the lake vessel; that the rate by the lake vessel upon the canal would equal 260 per cent of the lake vessel rate upon the lakes, and 250 per cent of the barge rate upon the canal.

This vast difference is due to the much greater cost of construction of lake vessels as compared with that of canal barges and to the larger crews on the former and the interest upon the investment and other charges. This difference is so great that a large margin of profit would remain in favor of the barge even after paying transfer charges at Buffalo. There would be no advantage in favor of the larger vessel in transfer charge at New York and all persons qualified to express an opinion agree that lake vessels could not sail upon the ocean profitably or safely.

Owing to this latter fact the cost of transfer at New York upon the larger vessel would make its use prohibitive. Such vessel would have to discharge cargo upon dock or into lighters for distribution to the trans-Atlantic vessels for which it was destined. If transferred to dock it would be again transferred to lighter and a third time transferred to the ocean vessel, or if transferred to lighter and thence to ocean vessel only two transfers would be necessary, far exceeding in cost the one transfer at Buffalo, and one at New York if carried in a barge.

It is manifest that the large lake vessel could not be moved economically from one steamship line to another in the harbor and so distribute its cargo so destined and would be obliged to tie up and distribute by lighter.

There is an error or two in Mr. Gardner's calculations. Lake steamers do not travel at the rate of 13 knots per hour. Their usual rate, loaded, is about 11 miles per hour. He is right, however, in saying that the style of lake ship is not adapted to the extremely restricted waterway of a ship canal. It is well adapted for reasonably rapid travel at low power in open water and is designed for the utmost expedition in loading and discharging cargo. The lake steamer is purely designed for lake purposes. Time would be seriously wasted in operating the large lake steamers over the long stretches of a ship canal and when they reach tidewater they would not be adapted for any service obtaining there. They are not structurally intended for navigating salt water.

AROUND THE GREAT LAKES.

Capt. John Quinn, the veteran diver, died at his home in Detroit last week.

The purchasers of the steamer Germanic from the Reid Wrecking Co. were the Manley-Chew Co., of Midland, Ont.

The Hardy Paint & Varnish Co., Toledo, has engaged Capt. F. B. Cody, of the steamer Eugene Zimmerman, as their marine representative.

The annual convention of the Tug Firemen and Linesmen Association is being held at Port Huron this week.

President Stack and Secretary Casey of the Marine Firemen, Oilers and Watertenders Association are making a tour of the lakes.

The Sub-Committee of Fleet Engineers appointed to appear before the Steamboat Inspection Service to argue for modification or amendment of existing rules, left for Washington this week.

Capt. Alex J. McKay, the commander of the Detroit & Cleveland Navigation Co.'s fleet, was seriously injured in the railroad wreck near Britton, Mich. Several of his ribs were broken.

Robert W. Hunt & Co. have established their St. Louis office, which is in charge of Mr. C. W. Gennet Jr., at 1445 Syndicate Trust building. They have arranged to locate their chemical and cement laboratory in the same building.

The new channel in the St. Clair river at Russel's Island will pass on the United States side of the island and will rejoin the regular south channel at the head of Harsen's Island. The cost of dredging will be about $75,000.

The contract for dredging Section A of the Saginaw river has been let to the Toledo Dredging Co. The Central Dredging Co. of Cleveland was the lowest bidder for dredging Section B, but approval of this bid has not yet been received from Washington.

The old steamer Empire State has been sold by Berry Bros. to Philip Schorbach, of Muskegon, who will use her as a stone carrier in constructing the Ludington breakwater. The Empire State was in her day one of the finest of package freighters. She was built in 1862 and is 212 ft. long and 33 ft. beam.

The Upson-Walton Co. of Cleveland began the thirty-seventh year of its existence as a company on Saturday last. The history of this company is practically the history of the commercial vessel on the lakes. Were the history of this company faithfully written it would make one of the romances of trade.

The Pittsburg Steamship Co. has awarded a contract to the Conneaut Drug Co., Conneaut, O., for the manufacture and equipment of medicine chests for each of its vessels. Dr. Harold S. Wilson, surgeon for the Pittsburg & Conneaut Dock Co., at the recent meeting in Cleveland of the Pittsburg Steamship Co.'s captains, recommended these chests. They will be small, but will contain all necessary articles to care for the sick on board ship.

The Hanna Transit Co. of Mentor was organized this week with the following directors and officers: W. C. Richardson, president, manager and treasurer; Howard M. Hanna Jr., vice president; T. H. Paine, secretary; David Z. Norton, Howard M. Hanna Jr., J. H. Sheadle; C. C. Bolton and W. C. Richardson, directors. The new steamer building at the Cleveland yard of the American Ship Building Co. which is owned by this company will be named the Howard M. Hanna Jr., and the steamer will be ready by the opening of navigation.

Capt. James Reid of the Reid Wrecking Co. succeeded in releasing the sunken steamer Pabst in the Detroit on Tuesday of this week. The Pabst went down on Nov. 11 and the work of releasing her was begun almost immediately. This wrecking feat is without doubt the most difficult ever undertaken on the lakes. The vessel was surrounded by masses of ice which formed a barrier about the vessel, but tugs and pumps were kept persistently at work wth the result that the boat released itself and will be towed into port as soon as the path is cleared.

Orders issued from the war department at Washington stipulate that no further dredging is to be done at Rocky river, Lake Erie. For the past two or three seasons considerable work has been done at the expense of the government in deepening the river bed at this point, some $30,000 being expended on the work. As the harbor has no commercial value and is used chiefly as an anchorage for pleasure craft the depth now afforded is sufficient and no more dredging need be done.

As the result of the visit to Washington of Major Judson, government engineer with headquarters at Milwaukee, Congressman Stafford has introduced the following bills in the house: To authorize the establishment of a gas buoy with fog signal attachment on or near Garden Island shoal; to authorize the establishment of a lightship and fog signal near the southeast shoal off North Manitou Island; to authorize the establishment of a fog signal at Grand Point Au Sable; to establish a light and fog signal on Lansing shoal.

Agreements have been concluded between the executive committee of the Lake Carriers' Association and the loaders affiliated with the longshoremen's association. By the terms of the agreement the same wages obtain as were paid last year, that is, 50 cents an hour and 75 cents an hour for work on Sundays, legal holidays and overtime. All boats must be loaded and unloaded with union men when they can be furnished, a penalty of 10 cents per thousand to be imposed when non-union men are employed in cases where union men might be obtained. Forty loading locals were represented at the Chicago conference, which was presided over by President Daniel J. Keefe. The unloading agreement will next be taken up.

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ANNUAL CONVENTION MARINE ENGINEERS' BENEFICIAL ASSOCIATION

The National Marine Engineers' Beneficial Association of the United States held its thirty-third annual convention at the Ebbitt house, Washington, D. C., from Jan. 20 to 25. The reports of the representatives and officers showed the organization to be in a highly prosperous condition, with a substantial increase in membership during the business year.

The officers elected to serve during the ensuing year were as follows: W. F. Yates, New York, national president; Chas. S. Follett, Seattle, Wash., first national vice president; Evans I. Jenkins, Cleveland, O., second national vice president; Albert L. Jones, Detroit, Mich., national secretary; John Henry, Saginaw, Mich., national treasurer. The representatives elected to serve on the advisory board are Wm. Sheffer, Baltimore, Md.; W. D. Blaicher, Buffalo, N. Y., and Frank J. Houghton, New York City.

Contrary to the usual practice, the association took no action on the lake wage schedule, but referred the matter to the business agent and the executive committee for the lake district. Last year the executive committee of the engineers' association made an agreement for the season with the fleet engineers which was later ratified by the executive committee of the Lake Carriers' Association, and it is expected that this method will be pursued during the present season. No arrangements have been made for a conference with vessel owners and probably will not be for some time yet.

President Roosevelt on Wednesday received the representatives and friends at the White House, and briefly addressed his visitors. In a few words he expressed his pleasure at being afforded the opportunity of meeting a representative body of marine engineers, and spoke of the great advance made during the last quarter of a century in marine propulsion and the shipping world generally.

The representatives and friends, at the invitation of the National Marine Engineers' Supplymen, who were also in session at the Ebbitt house during the week, attended the theater on

NATIONAL MARINE ENGINEERS' BENEFICIAL ASSOCIATION IN SESSION AT WASHINGTON. READING FROM LEFT TO RIGHT—SECRETARY ALBERT L. JONES, FIRST VICE PRESIDENT CHARLES S. FOLLETT, PRESIDENT WILLIAM F. YATES AND TREASURER JOHN HENRY ARE SIXTH, SEVENTH, EIGHTH AND NINTH IN THE FRONT ROW RESPECTIVELY.

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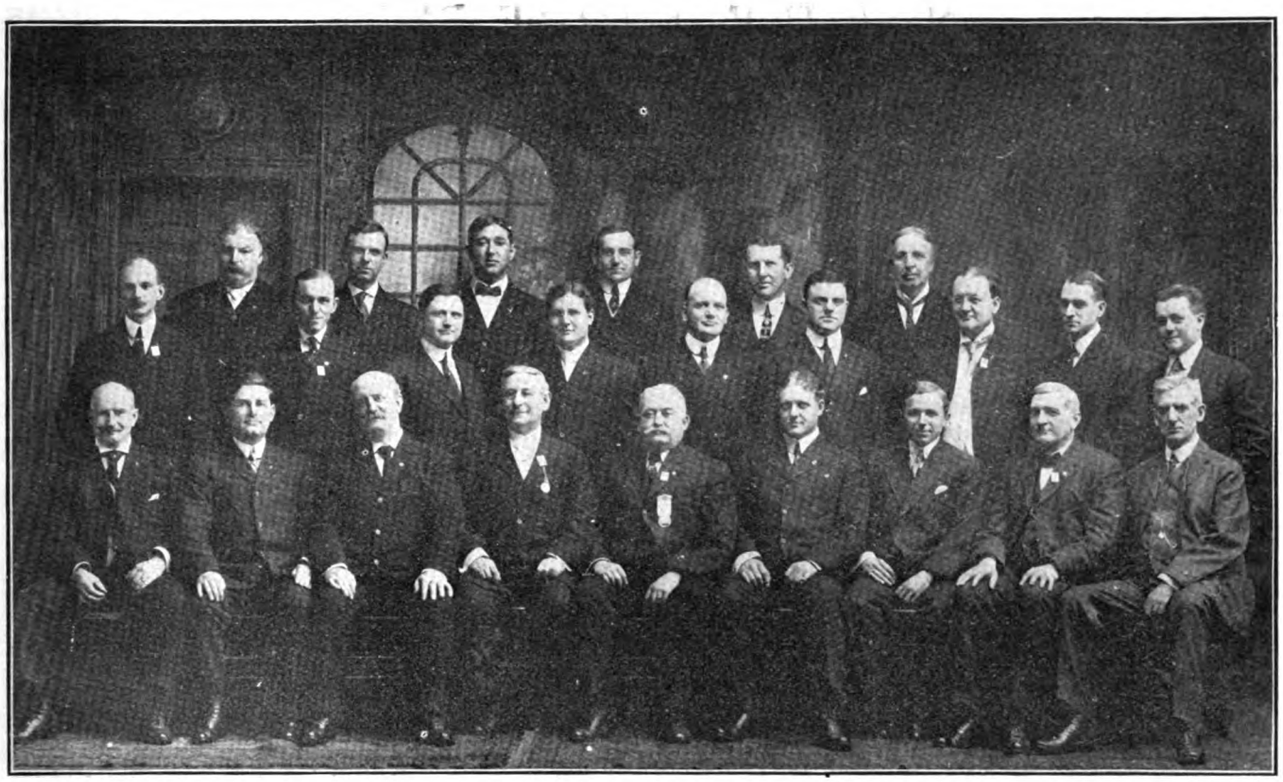

NATIONAL MARINE ENGINEERS' SUPPLYMEN AT WASHINGTON.
READING FROM LEFT TO RIGHT—PRESIDENT J. L. MCGILVRAY AND VICE PRESIDENT HERBERT SELF ARE FIFTH AND SIXTH IN THE FRONT ROW RESPECTIVELY.

Monday evening. Several automobile parties and stag parties at the various headquarters of the supplymen also helped to fill in the few spare hours at the disposal of the representatives.

The smoker given on Thursday evening at the New Willard hotel was the event of the week, the supplymen providing an excellent program of entertainment for about 500 guests. The affair was an entirely new departure in the form of entertainment provided, the platform, at the suggestion of John W. Armour, being fitted up to represent a cafe scene. The performers occupied seats at tables distributed around the platform, and at the suggestion of the leading spirit contributed song or story when the applause following the previous contribution had subsided. During the intervals between the general choruses the entertainers toyed lightly with beer glasses, the lubricating material being dispensed with unfailing regularity by Joe McKenna, who had for the occasion concealed his individuality behind a coat of burnt cork.

The opening medley was well received, and consisted of selections from popular songs. The "March Song" rendered by Bert Self commanded repeated encores, Mr. Self's contributions on such occasions being always highly welcome. "Stories of Stageland," by John Lloyd Wilson, were extremely amusing, Mr. Wilson being a master hand in dialect. Frank Corbett and William Redmond were the tenor soloists, their ballads being well received. They were repeatedly encored, and, happily, had come prepared. Billy Murray was on the program for "Up-to-Date Ditties," his songs being, like those of last year, the latest in all that is popular. Mr. Murray covers Irish and coon songs with equal ease and excellence.

The work of Joe McKenna is always good, his songs being strongly supported by "The Bunch," to quote the program. The New York Male Quartette, consisting of Wm. Redmond, F. Corbett, Edw. Campbell and J. L. Wilson, rendered some pieces from their extensive repertoire. Lastly, we had Jack Armour in song and story, Mr. Armour having a reputation as a raconteur and general entertainer known from coast to coast.

Fifteen minutes were occupied during the evening in attending to the wants of the inner man, the lubricants and solids being distributed by a small army of hustling waiters. All sorts of cigars and tobacco pipes were in evidence, our near-tobacco friend, the cigarette, being also to the fore.

The guests of the evening, in addition to the representatives and officers of the M. E. B. A. and the Masters and Pilots Association, were the following: Assistant Secretary of the Navy T. H. Newberry, Chief of Staff Capt. A. F. Dixon, bureau of steam engineering, and Commanders B. C. Bryan, T. P. Norton, W. P. White, I. S. K. Reeves, R. C. Denik, R. S. Griffin, W. M. Parks, W. S. Smith; Major Neville, commander of marines, U. S. Navy Yard, Washington, D. C. The treasury department was represented by James B. Reynolds, John H. Edwards, Walter V. Ludlow, Robt. J. Tracewell, L. P. Mitchell, Judge C. N. Foree, and Edward C. Robinson. The U. S. Revenue Cutter Service was represented by Capt. Worth G. Ross and Engineer in Chief C. A. McAllister; assistants, J. C. Walton, Chas. S. Root, H. Kotschmar Jr.; Engineer in Chief Geo. Warrington, U. S. Lighthouse Service; Superintendent of Construction R. Zirpol; assistants, bureau of engineering and construction, Lang, Savage, Barton, Miller, La Varre, Damon and Thompson; Chief of Service Capt. Sumner I. Kimball and Lieut. Ballinger, U. S. Lightship Service; Commissioner General of Immigration F. P. Sargent; C. P. Neill, commissioner of labor; R. S. Newham, U. S. Weather Bureau; Howard S. Weiss, U. S. Forest Service; quartermasters department, Major I. W. Little, Lieut. Col. J. B. Bellinger, Major R. McA. Schofield

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and Capt. H. L. Pettus; Geo. A. Knight, assistant civil engineer, quartermaster general's office; Dr. Westessen, chief chemist, U. S. Navy Yard, Washington, D. C.; Chief Clerk Frank H. Bowen, bureau of commerce and labor.

Supervising Inspector General Geo. Uhler, U. S. Steamboat Inspection Service, was also a guest, and Captains Harris, Dorsey, Dunn, Oast, Birmingham, Stone, Sloan, Cumbah and Westcott, of the board of supervisors; O. H. Tittnan and Mr. Perkins, of the Coast and Geodetic Survey; Captain John Ross, chief of bureau of engineering and construction, and Assistants Graves and Chase; Capt. J. H. Poole, State, War and Navy building; Superintendent of Capitol Mr. Woods; Messrs. Hodges and Anderson, Isthmian Canal Commission; Congressmen Wm. Huges, Paterson and Le Gage Pratt, of New Jersey; Congressmen J. W. Fordney and Geo. A. Loud, of Michigan.

The responsible position of accompanist was filled by Henry Frantzen, who proved most versatile and apt.

NATIONAL MARINE ENGINEERS' SUPPLYMEN.

The officers elected for the ensuing year by the National Marine Engineers' Supplymen, in session at Washington, are: J. L. McGilvray, president; Herbert Self, vice president; and William G. Le Compte, secretary-treasurer.

The members to act on the various committees in the ensuing year are:

Committee on exhibits—Harry N. Bennet, John W. Armour and R. R. Row.

Committee on invitations—A. K. Waycott, S. Inglis Leslie, Harry N. Bennet and R. R. Row.

Committee on printing—Herbert Self, F. R. Low and John W. Armour.

Theater committee—Geo. C. Penboss, J. J. Cizek and N. S. Kenney.

The firms and representatives in session were:

Jenkins Bros. Valves. William G. Le Compte.

Bird-Archer Co. Boiler compound. D. O'Connell and J. R. Gatchell.

The Ashton Valve Co. Valves. Frank Corbett and C. W. Buckelew.

Griscom-Spencer Co. General engineers. R. R. Row.

New York Lubricating Oil Co. Oils. William Murray.

Roe Stephens Mfg. Co. Valves. E. P. Fitzgerald.

Multicoil Co. General engineers. Louis L. Bernier.

Dearborn Drug & Chemical Works. Boiler compound. William B. McVicker.

Peerless Rubber Mfg. Co. Packing. J. L. McGilvray.

Leslie Co. Reducing valves. S. Inglis Leslie and J. J. Cizek.

George W. Knowlton Rubber Co. George W. Knowlton.

Home Rubber Co. Packing. A. R. Foley.

New York Belting & Packing Co. Packing. Charles A. Wilhoft and C. A. Meyer.

H. W. Johns-Mansville Co. Asbestos. H. W. Wiener and A. H. Davis.

Phillip Carey Co. Asbestos. N. S. Kenney and Frank H. Shipe.

THE LATE CHARLES W. MARTIN JR.

Garlock Packing Co. Packing. Robert H. Jones.

Standard Oil Co. Oils. George H. Norton.

Empire State Engineering Co. General engineers. Harry J. Marks.

Mason Regulator Co. Reducing valves. F. A. Morrison.

D. T. Williams Valve Co. Valves. Charles K. Thomas.

National Lead Co. Phoenix metal. D. E. Lynn.

Liberty Compound Co. Boiler compound. Harry N. Bennet.

Lunkenheimer Co. Valves. William Schmidt Jr.

Greene, Tweed & Co. Packing. H. S. Demarest and F. E. Ransley.

Crandall Packing Co. Packing. Herbert Self and A. K. Waycott.

Chapman Valve Mfg. Co. Valves. Herbert E. Stone.

Revere Rubber Co. Packing. Geo. C. Penboss and F. E. Dodson.

The *"American Marine Engineer."* Charles I. Felthausen and Carl Hunt.

"Power." F. R. Low and John W. Armour.

The MARINE REVIEW. A. Ross Mackay.

Before the election of officers at the first day's session, Mr. McGilvray, in the chair, spoke of the great loss the supplymen had suffered in the death of Charles W. Martin Jr., late secretary and organizer of the association. A letter of condolence, expressing the great love and esteem in which the deceased was held, will be drawn up by the members and forwarded to his family.

The late Charles W. Martin Jr. died Tuesday, Dec. 31, after an illness of three weeks of pneumonia. He was assistant general manager of Jenkins Bros., of New York, valve manufacturers, having been in the employ of the firm during his entire business career. He was an honorary member of the Marine Engineers' Beneficial Association of New York, and belonged to many other technical and trade organizations. "Charlie" Martin died, deeply regretted, in his 38th year survived by a widow, a daughter of five years and a son of two.

MARINE ENGINEERS' BENEFICIAL ASSOCIATION ELECTIONS.

Following is the result of various elections in the various harbors of the Marine Engineers' Beneficial Association:

No. 2, Cleveland, O.: President, Peter Robertson; first vice president, Wallace Tomey; second vice president, Thomas W. Stock; recording secretary, A. M. McEachran; business agent, Wm. Kelley; treasurer, John N. Kirby; trustees, John Skelly, Chris Castle, John N. Kirby; delegates to national convention, E. T. Jenkins, David Donaldson and Robert Cummings.

No. 3, Detroit, Mich.: Past president, D. N. Humphrey; president, Wm. Nolan; vice president, Ed Naglevort; recording secretary, F. E. Paine; financial secretary, F. Kenyon; corresponding secretary and treasurer, A. L. Jones; representatives to national convention, A. L. Jones, F. Robinson, D. N. Humphrey; alternate, M. J. Gilligan.

No. 5, Baltimore, Md.: President, Wm. Sheffer; vice president, John H. Adams; recording secretary, J. H. Mittendorff; corresponding secretary and business manager, James H. Higgins Sr.; financial secretary, Francis M. Nelson; treasurer, Wm. J. Kane; board of directors, James H. Higgins Sr., John H. Adams, Marcus M. Black, Harry P. Walker, Harry Amos, James H. Higgins Jr., John Milne; delegates to national convention, Wm. H. Hyman, Wm. J. Kane, Wm. Sheffer, J. H. Mittendorff, Joseph P. Brady.

No. 9, Milwaukee, Wis.: President, Joseph R. Mason; first vice president, Arthur L. Barnes; second vice presi-

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dent, Charles Grobben; treasurer, James Rossan; financial secretary, Wm. McSweeney; recording secretary, Thomas McSweeney; corresponding secretary, Fred H. Krueger; chaplain, Benjamin Doepke; conductor, Wm. A. Long; doorkeeper, Otto Luedtke.

No. 17, Cincinnati, O.: President, Albert Johns; vice president, A. J. West; financial and corresponding secretary, George S. Collins; treasurer, Arthur Doty.

No. 21, Vicksburg, Miss.: President, A. M. Robins; first vice president, Nicholas Hill; second vice president, Clyde McAnally; corresponding secretary and treasurer, Thomas Tucker; financial secretary, J. W. Lane.

No. 27, Bay City, Mich.: Past president, Mike Walsh; president, Theodore Lang; vice president, J. B. Hart; recording secretary, Palmer D. Holmes; corresponding secretary, L. C. Schwall; financial secretary, Wm. Rogers; treasurer, Joseph Nold; chaplain, D. L. Covyeow; conductor, J. B. Welman; inner doorkeeper, J. L. Jersey; outer doorkeeper, Joseph Wortz; representative, N. P. Slater; board of trustees, L. C. Schwall, Wm. L. Sperrey, Joseph Wortz.

No. 35, San Francisco, Cal.: President, J. Albert Reed; first vice president, Thomas D. Bulger; second vice president, Peter Peltret; treasurer, Wm. J. Brady; secretary, Martin Anderson; business manager, J. J. Searey; representatives, Wm. J. Brady, J. E. A. Miller; alternate, James Kane.

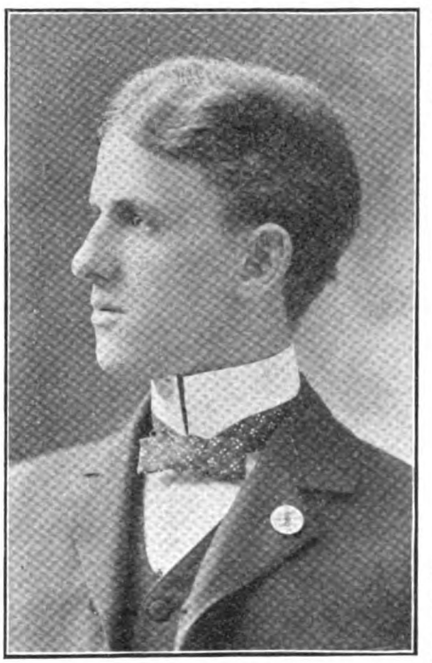
No. 28, Seattle, Wash.: President, W. B. Jacklin; first vice president, A. J. Dudley; second vice president, H. P. Tucker; corresponding secretary, C. F. Follette; recording and financial secretary, G. W. Slater; treasurer, H. W. Farmer; trustees, W. H. Snyder, Paul Barnes, D. F. Cross; representatives to national convention, W. B. Jacklin and C. F. Follette.

No. 45, Savannah, Ga.: President, W. B. Hills; vice president, Wm. Ryan; secretary, W. L. Salter; treasurer, Frank Lucree; chaplain, J. E. Chase; conductor, James Craggs; doorkeeper, M. Linski; trustees, H. S. Golding, W. B. Hills, J. T. Kearney.

No. 47, Sault Ste. Marie, Mich.: President, Norman Rains; vice president, Herbert Newman; financial secretary and treasurer, John Jordan; corresponding secretary, H. D. Wood; recording secretary, Martin R. Hamlett.

No. 53, Marine City, Mich.: President, Wm. McCarron; vice president, Wm. Densmore; recording secretary, George Love; corresponding secretary, H. Stone; financial secretary, Frank Ouelette; treasurer, H. Stone; trustees, Charles Burns, Marcus Hill, John Fritz; delegates to national convention, Frank B. Parker, Marcus M. Hill.

No. 55, Cheboygan, Mich.: Past president, John H. Lowery; president, J. A. McDougall; vice president, W. W. McLaughlin; recording secretary, Wm. J. Clark; corresponding secretary, Archie Stalker; financial secretary, John S. Harrington; treasurer,



WILLIAM G. LE COMPTE.
Secretary and Treasurer National Marine Engineers' Supplymen.

Archie Stalker; board of trustees, J. A. McDougall, Harry Roberts, Patrick Eustice.

No. 62, New London, Conn.: President, Edward Havens; first vice president, George Fraser; second vice president, Harry Albin; recording secretary, Julius A. Koch; corresponding and financial secretary, Frank K. Beckwith; treasurer, Clarence E. Edwards; delegate to national convention, Fred L. Edwards; alternate, Julius A. Koch.

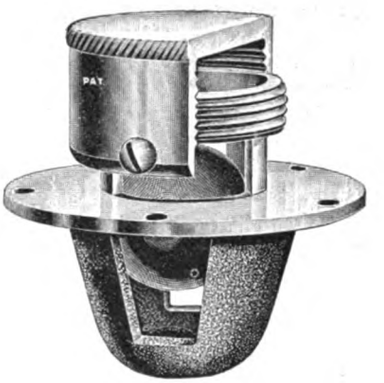
No. 67, Saugatuck, Mich.: President, S. L. Newnham; vice president, A. W. Coates; corresponding secretary, James K. Dole; financial secretary, James K. Dole; treasurer, James K. Dole; recording secretary, Henry C. Hawkins.

No. 93, Washington, D. C.: President, W. B. Hayden; vice president, James N. O'Donnell; corresponding and recording secretary, J. A. Watts; financial secretary, J. P. Van Ostrand; treasurer, Joseph W. Fox; chaplain, Thomas L. Shannon; conductor, W. T. King; doorkeeper, Chace L. Nash; trustees, W. A. Moore, J. P. Richie, J. T. Tenneson; delegates to national convention, J. A. Watts and Charles T. Kersey.

SAFETY BOAT PLUG.

The illustration herewith shows a new safety boat plug recently invented by G. W. Renton, Brooklyn, N. Y. Its special features of improvement over old styles is that it drains all the water out level with the bottom of the boat.

The cap is always engaged on all the screw threads whether it is fully opened or closed. This is an important feature as there is no danger of injuring or painting the thread. The cap is secured



always to the body of the plug by a stop device at full opening. If the boat is put into the water with cap open the rubber ball floats up and stops the hole in the flange. These improvements are especially necessary in life boats as with old-style plugs the cap is hard to start on the thread in a rough sea and impossible if the thread has been carelessly painted. These disconnected caps are not always found in the boat when wanted. With the Renton plug, a twist of the wrist and the cap is down water tight. They are manufactured by the inventor at 431 Broadway, Brooklyn, N. Y.

The navy department will open bids on Feb. 18 for the sale of the U. S. S. Canonicus and Pinta. The Canonicus is an old-time civil war monitor which was stricken from the navy list Jan. 5, 1904. She was used for exhibition purposes during the Jamestown Exposition. The Pinta is one of the last of the Civil War tug boats, being an iron vessel built by Reany, Son & Archbold, at Chester, Pa., in 1865. She has been used by the naval militia of the state of California for several years and is now at the Mare Island navy yard. The Pinta is 137 ft. long and of 550 tons displacement.

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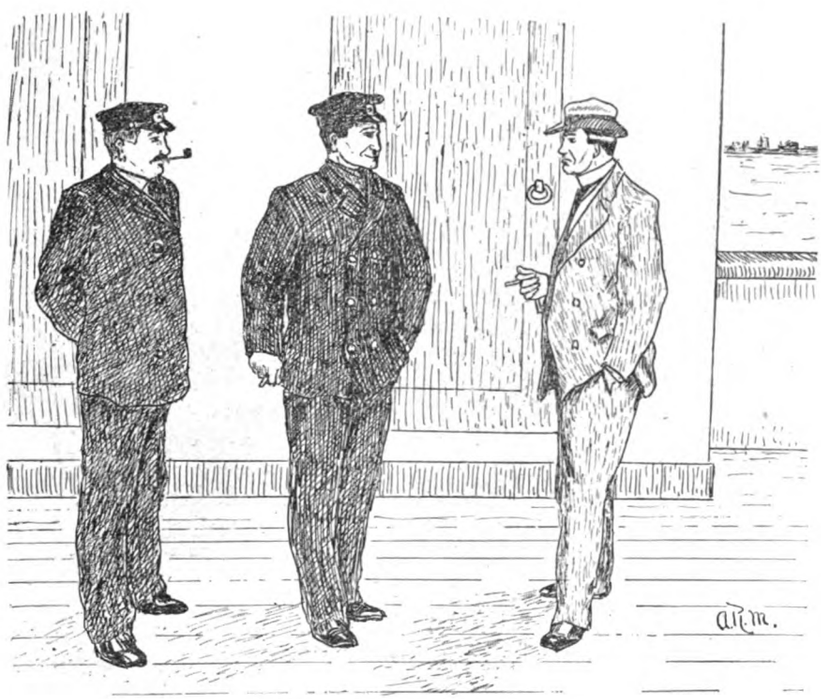
"IN THE MERCHANT SERVICE"

The third engineer and fourth mate had spent most of the day visiting one another in their respective quarters. Their numerous conversations had covered all manner of subjects, in the end, however, usually working round to bitter denunciations of the cruel fate which kept them bound to the steamer Astonville during the entire Sunday the vessel was in port. On the evening watch and during the night the time passes quickly and cheerily enough, but on the long and dreary day of rest, when even the mess boy has donned his misfit suit, borrowed a hat, and bidden temporary farewell to the scenes of his triumphs, the man standing watch finds time hang heavy on his hands and realizes how mighty lonely it is possible to feel.



"ANOTHER OF JOHNSON'S FRIENDS."

The companions in misery had just stepped out on the deck to look at the weather, for about the 100th time, when their attention was drawn to a figure clambering up the ladder leading from the wharf to the rail of the Astonville.

"Stranger coming aboard," said the mate, seeing a welcome break in the monotony, "I wonder who he is."

"Another friend of Johnson's," answered the third, adding, "Darned if I can make out where the man gets all the acquaintances."

The engineer's guess was correct. The stranger was another of Johnson, the fourth engineer's, numerous friends, and any friend of Johnson's was—on this occasion, anyway,—a friend of the third engineer and fourth mate of the Astonville.

The stranger was assured that the fourth engineer would be aboard presently, that they believed he was expected, and that he was cordially welcome, meanwhile, and could make himself very much at home in the cabin of the third.

"Sit right down," said his host, as he unfolded a camp chair seen only on special occasions, "sit right down and have a cigar."

The stranger selected a cigar from the box, lit up, gently sniffed the aroma of the weed and pronounced it as excellent. In response to the pressure brought to bear upon him by the delighted third he—mildly protesting—selected a couple for future use ashore. The mate, avoiding the surprised look of the engineer, offered to bring some whiskey which he believed he had in his room, and went after it. All might have been merry as the marriage bell, but for some peculiar traits developed in the manner of the stranger. He was no diplomat.

"How old is this ship?" he asked, as he replenished his glass.

"Five years," said the mate, lying cheerfully, as he nudged the engineer.

"Five years?" echoed the stranger, who had given his name as Wilkins, "Lord, I would have guessed her about 25. Maybe it's because she's dirty and needs painting," he added.

The mate swallowed hard. "She's not as pretty as usual," he explained, "being at present a cattle puncher."

They smoked in embarrassed silence, the stranger's eyes seemingly taking in the dimensions of the room.

"Don't you fellows feel cramped in these funny little rooms?" he asked, happening to notice the mate expectorate clear across the room into the alleyway.

"Why," said the indignant engineer, "these are big rooms compared with some I have seem on tramp steamers." He emphasized "tramp," and the stranger's eyes opened in amazement.

"Isn't this a tramp then?" he queried, "I am afraid I am very ignorant on such matters."

"Well, she isn't exactly a subsidized mail ship," answered the mate, with withering sarcasm, "but she belongs to a line, therefore is not a tramp."

Muttering something about having heard of a "line of tramps" the stranger rose to his feet and said that he guessed he wouldn't wait any longer the coming of Johnson. Strange to say, the desire for company had been forgotten by the engineer and mate, and they offered to see the visitor to the ladder. Passing along the deck the stranger paused to peer through a door in the bulkhead. Within all was in semi-darkness.

"What a dismal hole," commented Johnson's friend, "what have you away down there, coal?"

"That's the engine room," corrected the third, in a voice husky with emotion, "it's kind of dark at present."

"But, I thought the engine rooms of liners were bright and shining," pursued the guileless one, "and the engines polished."

"Well, you see," answered the engineer, "we always keep 'em polished when—er—when we are at sea."

A few moments later the two seafarers were watching from the port of the engineer's room the actions of Johnson's friend, on the wharf.

"What's he staring back at," asked the mate, "d'ye think he's noticed that old dent in the bow?"

"Seems to think it is something to laugh at if he has."

When they told Johnson in the evening that his friend Wilkins had been aboard he was astonished. "Wilkins," he exclaimed, "I don't know any Wilkins."

"Hard-looking cuss, with the face of a thug," said the third engineer.

"Loud checked suit and near-cowboy hat," said the more conservative mate.

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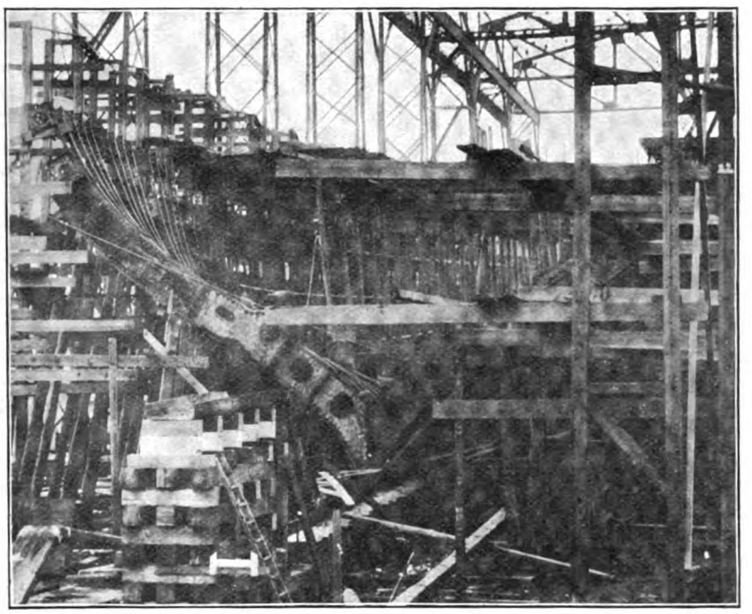
"Oh, was *his* name Wilkins," said the fourth engineer carelessly, "why, I made his acquaintance on the platform of a car Thursday evening. I think I told him to drop over and see me some time."



BATTLESHIP NORTH DAKOTA. PHOTOGRAPH TAKEN JAN. 27. FRAMING FROM AFT.

The engineer and mate looked after the disappearing form of Johnson. "Isn't that the limit?" they asked in unison.

THE "STAND-BY MAN."

BATTLESHIP NORTH DAKOTA.

Herewith are published two photographs of the battleship North Dakota taken fore and aft on Jan. 27 showing the progress of six weeks. These photographs do not show all the work which has been done, as a large number of shell plates are in position and riveted up. The North Dakota is in reality about 18 per cent complete.

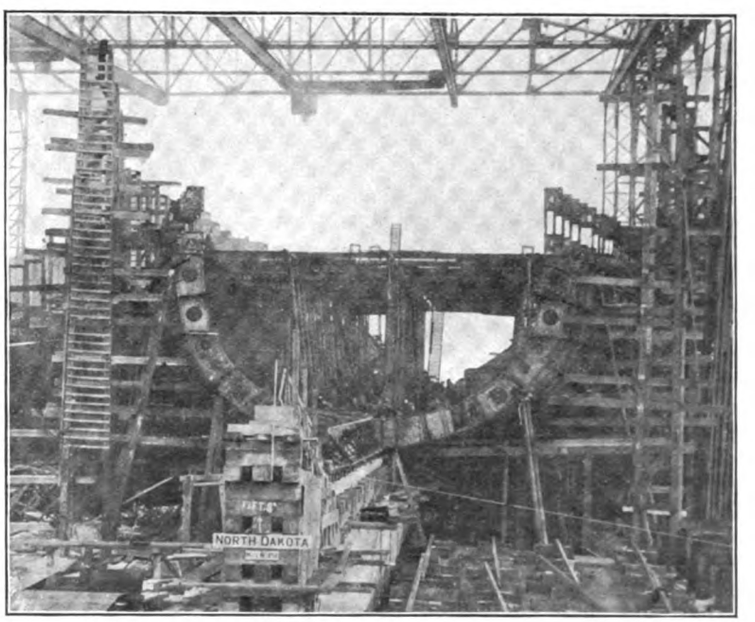
COAST SHIPYARD NOTES.

The steam yacht Tarantula, owned by W. K. Vanderbilt, is being thoroughly overhauled at the yard of the W. & A. Fletcher Co., Hoboken, N. J.

E. W. Heath, Tacoma, Wash., is engaged in making extensive changes to the steamer Sentinel, owned by the Kitsap Navigation Co., Seattle, Wash. The steamer's beam is to be extended 4 ft. and other changes will be made which will make her as good as new.

Charles L. Rohde & Sons, Baltimore, Md., have almost ready for launching an open lighter building for M. W. Adams. The vessel is 85 ft. long, 26 ft. beam and 7½ ft. deep. The same company has frames up for two other lighters for Baltimore owners.

The Maryland Steel Co., Sparrow's Point, Md., is making extensive alterations to the Baltimore Steam Packet line steamer Alabama, which when completed will transform that vessel into almost a new one. The deck cabin is being extended aft to allow space for 30 more staterooms and in addition the steamer is being given a thorough overhauling.



BATTLESHIP NORTH DAKOTA. PHOTOGRAPH TAKEN JAN. 27. FRAMING FROM BOW.

Crawford & Reid, Tacoma, Wash., have recently completed a cannery tender for the Russian Cement Co., which will be used in connection with that company's plant at Anacortes, Wash. The tender is a staunch, well-built craft, 71 ft. in length, 13½ ft. beam and 6 ft. deep, and is equipped with 65-H. P. gasoline engines.

LAKE SHIP YARDS.

The steamer J. J. H. Brown, building at the Lorain yard of the American Ship Building Co. for Capt. J. J. H. Brown, of Buffalo, will be launched on Saturday next.

The Wainwright Steamship Co. has been incorporated to operate the steamer Wainwright which was launched at Detroit last week for Edward Mehl, of Erie, Pa.

The Collingwood Ship Building Co., Collingwood, Ont., has reopened its ship yard, the workmen having consented to accept the proposed reduction of 15 per cent in their wages.

The keel for the steamer A. W. Thompson, building for W. H. Becker, of Cleveland, was laid at Bay City on Monday of last week.

The steamer Normania, building at the St. Clair yard of the Great Lakes Engineering Works for the Ashtabula Steamship Co., was to have been launched on Saturday last, but the ice in the St. Clair river was very thick and the launching was postponed until Wednesday of the present week when tugs broke the ice.

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FOR THE LAKE MARINE

In this department hereafter will be found everything of current interest pertaining to Lake Navigation. Masters are advised to consult it weekly for information of interest to them; and owners are invited to use it freely for the promulgation of all announcements of a general nature. The Marine Review will be placed aboard every vessel having membership in the Lake Carriers' Association, representing a registered tonnage of nearly 2,000,000 tons, and can, therefore, be depended upon as a reliable courier to the entire fleet. It will reach every vessel in active service weekly. It is the intention to make this department complete so that at the end of the year it will be an authentic record which should prove of permanent and increasing value to owners and masters alike.

The MARINE REVIEW will in this department publish the addresses delivered at the annual meeting of the Pittsburg Steamship's Co.'s captains held at Cleveland Jan. 1, 2, 3 and 4, and will, in addition, have many interesting comments to make on the proceedings which will be of vital interest to every man aboard ship. To begin with there will be found below the remarks of Harry Coulby, president and general manager of the Pittsburgh Steamship Co., to his masters which will be found to be of equal interest to every master and owner on the lakes.

Mr. Coulby's address was as follows:

ADDRESS OF MR. COULBY.

"In opening this, our fourth annual meeting, I want to congratulate you all on the splendid showing you have made during the past year. Never in the history of lake business has the percentage of accidents to the tonnage of freight moved been as small as the record of our fleet during the past season, and I attribute this largely to the good results growing out of these yearly meetings at which we all meet together to talk over things and to make suggestions and recommendations that we believe will improve the service. We must not, however, rest on our oars and be satisfied with what we have accomplished in the past. I shall be disappointed if we do not keep progressing and each year show better results in our organization, in the discipline on our ships, and in our operation than we did the previous year. We, none of us, can stand still, and if we are not taking a step forward we shall find that we are stepping backward.

"These yearly meetings have been beneficial in drawing closer together with a better understanding of each other, of our shore force and you men who have charge of our ships, and while we have accomplished much in the past there is still much for us to do to still improve the service, and it is through the medium of these meetings that the foundation will be laid for this improvement. I have been much gratified during the past season with the many valuable suggestions that have been sent in by our captains, and I hope many of you have come with more suggestions that will still further benefit us. This is your meeting and I want to hear from each one of you. Do not be afraid to talk and I shall expect and invite a full discussion on all subjects that are submitted to the meeting and we will take all the time necessary to talk over every subject that is brought up.

"During the past year we promoted seven mates to command of steamers and I congratulate them on their good work. We appreciate the loyalty and industry of our mates and their reward will come through promotion as vacancies occur and they demonstrate their qualifications. It is more particularly to these younger men who are growing up in the employ that I expect these yearly meetings to be advantageous, and leads me to outline what I consider will still further tend to improve and safeguard the navigation of our ships. You older men should be just as much interested as the management in educating your subordinates on board the boats, as the captain's work must be much easier with a well-disciplined, intelligent crew than when it is necessary to pick up part of a strange crew every trip. All of you have more or less idle time on your hands during the winter months, and I have decided to have printed in pamphlet form the remarks made at this meeting, and also all the reports of the committees, decisions and rulings, and as soon as it is completed a copy will be furnished each one of you, and I trust during the winter months you will carefully read it over until you become thoroughly conversant with it. You should also make it a practice to read carefully over and study the pilot rules and navigation laws. Copies can be obtained from any of the local inspectors, and I would suggest that not only the captains, but the mates, devote some time each week to studying these rules and laws until they become thoroughly familiar with them, and if any part of them is not clear to you, confer with the local or supervising inspectors. I cannot conceive of anything more humiliating in case of accident than to find it was caused entirely, or in part, by ignorance of the rules by the officers of our ships, and I am sure it must be quite as humiliating to one of you to have to admit that such is the case.

"You will remember at our last meeting I laid particular stress on the number of accidents to our fleet through collisions and grounding in thick weather. Mr. Kelley, in his admirable paper, read at our last meeting, also emphasized these two subjects. Results from this discussion have been gratifying, as we only have record of two groundings in thick weather and one collision in fog. At this meeting we will broaden out and discuss full a number of other things affecting the navigation and safety of our ships. I have invited a number of gentlemen to address you who are not directly interested with the company—some of them are government officials who have charge of the different branches of navigation on the great lakes. These men are all working earnestly to improve the conditions on the great lakes and to aid you masters in your calling, and I am quite confident that great good will result, not only to you, but to lake interests by giving these men an opportunity to address you on the work they are doing in behalf of safe navigation.

"Our counsel, H. A. Kelley, will address you along similar lines contained in his address of last year.

"I have felt that some improvement could be made in the medicine chests that have been furnished to our boats in the past. While these medicine chests were originally gotten out for ships making long voyages and to, in a general way, take care of almost every kind of sickness, I felt that we should pay more attention to carrying such supplies as are needed in case of accidents. During the summer I invited Dr. Wilson, of Conneaut, to get up for us a medicine chest similar to that adopted by the 'Red Cross' Society, which is made up principally of supplies for emergency cases, such as scalding or personal injuries on the ships, and Dr. Wilson will come before you tomorrow and explain this medicine chest and give you some instructions as to how to take care of such emergency cases.

"On Friday morning Major Keller, who has charge of the United States Lake Survey, will address you on the work of his department, and I shall be very glad to have you make any suggestions to him along the lines of further aids to navigation.

"I have also invited Supervising Inspectors Westcott and Stone to address this meeting on rulings made by the department of commerce and labor on certain points of the laws and rules that do not seem to have been heretofore thoroughly understood.

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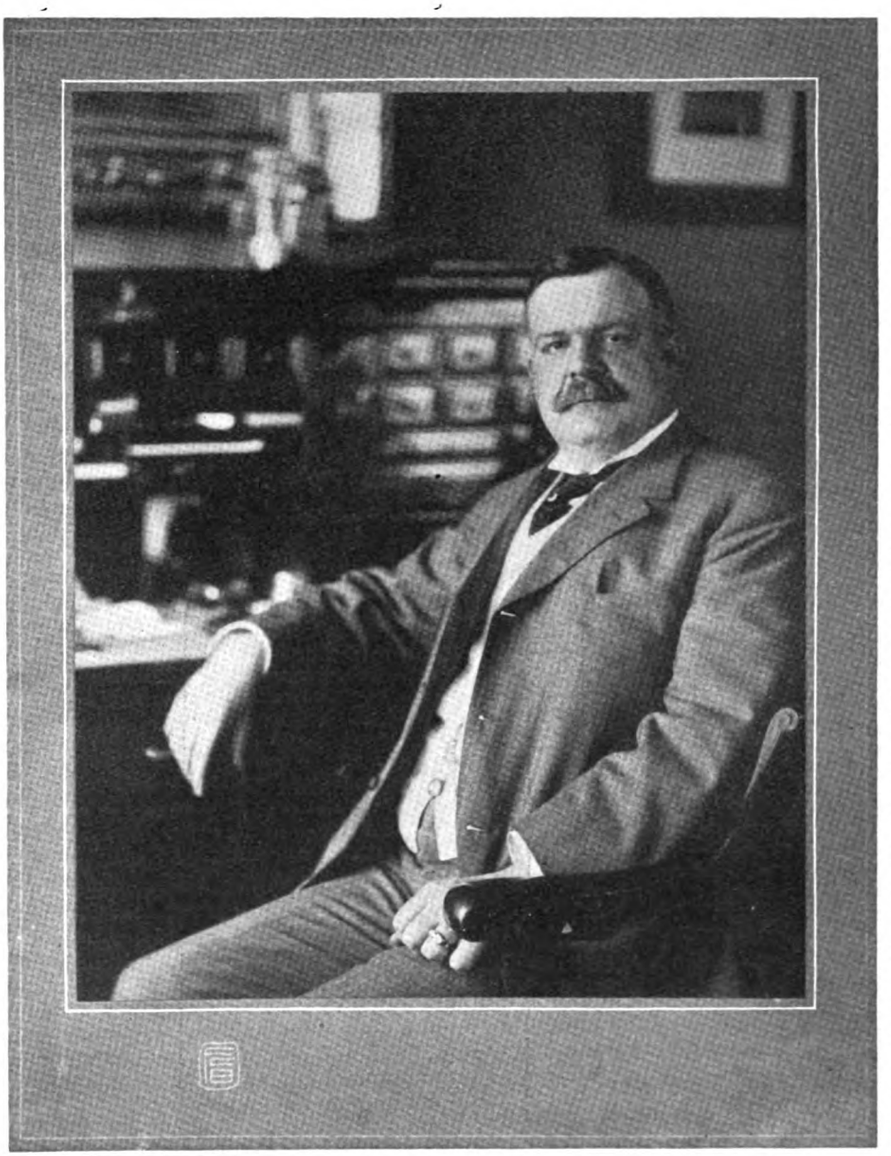
"Lieut. Windram, who has charge of the life saving stations on the great lakes, will also read a paper on this branch of the service.

"We have also been receiving considerable complaints of damage done our ships by the automatic unloading machinery on the docks and I have thought it wise to invite to this meeting the representatives of the docks, owned or controlled by the Steel Corporation at upper and lower lake ports, so that we may talk this matter over with them and see if there is not some way in which these costly accidents can be avoided or minimized. This steamship company is only a link in the chain for transporting the Steel Corporation's ores from its mines to its furnaces, and the loading and unloading docks are another link in the chain, and it is vitally important that each link should do its fair share of the work. It is against the policy of the Corporation for the representatives of the docks to try and save a few cents per ton for their companies at the cost of the steamship company, and the dock companies must appreciate that when through carelessness they are destroying or damaging the property of the steamship company, the Corporation, which is the owner of both companies, has to stand the loss. The same is true if any of the docks or machinery sustain damage through carelessness in handling our boats. For that reason it is absolutely necessary that the dock people should display as much interest in avoiding damage to our ships as though they were a part of the dock equipment.

"Probably some of you older men may think it a waste of time to have these gentlemen address you on points with which some of you may be entirely familiar, but you must remember that we are all the time educating and bringing up new men who have not had the many years' experience that you have had, and it is particularly in the interest of these younger men, whom we are promoting, that we have invited these gentlemen to come before you. I do not want any of you to feel that anything that may be said by me, or by those whom I have invited to address you, should be taken as a personal criticism. The interest of the owner and captain is mutual. The owner has his investments at stake, you have your reputation and position, and I believe the day is rapidly approaching when our policy of keeping a careful record of each of our officers will become general among owners and underwriters, the same as is done by the Lloyds' Association of London, and it will be the governing factor in appointments and promotions.



MR. HARRY COULBY,
President and General Manager Pittsburgh Steamship Co.

"On the lakes we hear a great deal about certain captains always having good luck in the navigating of their ships, and of others being unlucky, tending to leave the impression that all had used the same amount of judgment, care and skill with widely different results. I am not a believer in the wholesale application of this doctrine, as investigation of accidents clearly shows that a large percentage are due to lack of proper caution in navigating, violation of pilot rules and the mistaken idea that the captain is warranted in taking all kinds of chances in the effort to make time. There are, of course, exceptions, such as being caught in the rivers in fog without room to turn around, or where some other boat is responsible. With such a tremendous tonnage navigating the narrow waters connecting these lakes, it is the duty of us all to do everything we possibly can to avoid the loss of life and minimize the accidents.

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"I believe there is still room for much improvement in the discipline on board our ships. I was very much surprised to have it reported to me by our inspection committee that some of our captains admitted that there were certain parts of their ships that they had not visited during the summer, and I am afraid some of you have been gradually sliding into the easy way of sailing your boat, that is, attending to the navigating and not following up in detail the general upkeep of your ship. As I have repeatedly told you, the captain is the direct representative of the owner on board his ship, and the entire crew are subject to his orders. We hold you responsible not only for the safe navigation, but also for the discipline of your crew and the upkeep of your ship during the navigating season, with full authority in case of insubordination on the part of any member of your crew to discharge him. The first requisite towards discipline on board your ship is to try and get a good crew. Before this meeting adjourns I have no doubt you will have made selections of your mates for the coming season, and I think it would be well for you to consider seriously the question of their subordinates—wheelsmen, watchmen, deckhands, and your steward's department. I hope that we may be able to make a start along the line of getting good men on our ships in the subordinate capacities and having them remain with us during the entire season. Every man employed on board our ships should be looking forward and striving to do his work in such a manner as will enable the company to promote him as opportunity occurs. It has reached me there is some feeling among our mates that some of the masters of our first-class ships have shipped outside men as mates to the detriment of mates who have been with us some time and are looking for promotion. I trust this is not so, as it is absolutely against our policy. We must all be very careful in the event of a vacancy to satisfy ourselves that there is no man in a subordinate capacity in the line entitled to promotion, before we engage outside men.

"I now want to make some suggestions which I should be very glad indeed to have discussed in this meeting, and which we can modify or amend if it is wise to do so, after a full discussion.

DISCIPLINE.

First—When the ship is under way it shall be the duty of the watchman or wheelsmen to strike the time on the ship's bell every half hour. The official time of the ship, including the engine room, to be the pilot house clock, which shall be regulated by the captain.

Second—When out in the lake and weather conditions are favorable, there shall be a drill each day at noon, taking in rotation fire drill, boat drill, emergency steering gear drill, and testing all whistles, telegraphs and telephones.

Third—When out in the lake and weather conditions are favorable, the captain shall, during the day, make an inspection of some part of his ship, and so regulate the time of inspection that the chief engineer will accompany him through his department, and the mate through his department, and an inspection of the entire ship be made at least once a trip. A report of these drills and inspections to be entered in the ship's log for the information of the management.

Fourth—When the mates come on watch it shall be their duty to go to the engineer and obtain the number of revolutions made by the engine during the preceding watch. Forms will be furnished on which the engineer will give this information, and it shall be the duty of the mates to enter it in the ship's log.

Fifth—The captain will be held responsible for seeing that his wheel chains and quadrant sheaves and blocks are always in good condition, and if there is any question about the safety of the wheel chains, notify this office promptly so that new ones can be provided. I also want to call your particular attention to the pins in the sheaves and quarter blocks to see that they do not become worn beyond the point of safety.*

*Note.—After full discussion the above were unanimously adopted.

"The largest item of expense in the operation of ships on the great lakes is the cost of repairs, by reason of accidents, and to this particular subject we must give our most serious consideration. I have been making a careful investigation as far as it was possible of not only the accidents to our own fleet, but also of accidents that have happened to other ships on the great lakes. On my trips on the lakes I have noticed some things in the handling of ships that to me appeared hazardous, and taking chances unnecessarily, one is boats passing each other bound in opposite directions. In a good many cases it seems to me they tried to see how close they could pass each other, rather than to try and give each other as much room as possible consistent with safe navigation. There is really no necessity for coming so close to the dead line and I want you to pay particular attention to this point, bearing in mind that the mates, wheelsmen and watchmen are no doubt learning from you, and the tendency is for each fellow to think he can shave a little bit closer than the other and the final result is a collision. Again, has it not occurred to you there is really nothing gained by following each other in the river so closely as is frequently done? You will readily corroborate my observations that steamers of about equal speed will navigate the river so that the steamer astern will almost lap on the quarter of the steamer ahead. There is always present an element of danger in this close navigation, more especially as you are continually meeting boats, and unless you have received the assent of the steamer ahead to pass, you should not draw up closer than half a mile. This means, if you are running nine miles an hour and the steamer ahead should get into trouble and stop, you will only be about four minutes behind him.

"Don't forget how repeatedly I have reminded you that the lives of your crew and the safety of your ship must be your first consideration. We make a careful examination of our ships during the winter and before starting them out in the spring all repairs and renewals are made to put them in good, seaworthy condition. If renewals or repairs are required during the season of navigation report same promptly to this office and it will be taken care of.

"Don't forget in case you do not know where you are in thick weather to find the bottom with your lead line, as that is much cheaper than finding the bottom with your steamboat. When in doubt as to your position never neglect to use the lead.

"In the bulletin issued in August last I called your attention to the duties of the watchman, and I regard it of so much importance as to repeat it here:

> It has occurred to me that sufficient attention is not paid by the navigating officers of our ships to keep the watchman alert in performing his duties as lookout. I believe the rule should be adopted and rigidly enforced that the lookout report to the officer in charge of the ship everything he sees and hears affecting the navigating of the ship. To illustrate, in thick weather report promptly every time he hears a whistle and its bearing. When he hears an approaching steamer blow you a passing signal or you blow a passing signal to an approaching steamer and receive an answer, the lookout should instantly report the signal blown by the other steamer, and when he picks up a light he should immediately report its location, and the officer in charge acknowledge all such reports. I am a little afraid the lookouts have been taking it for granted that because they see a light or hear a whistle it naturally follows the officer did the same thing. I want you to train them so that when on watch they

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are constantly on the alert in fulfilling the law requiring a lookout.

"I also believe there are men shipping on these lakes as lookout men that are not qualified for the position on account of physical defects, either poor eyesight or poor hearing and inability to locate sounds. As you know, in case of litigation much depends upon the evidence of the lookout man, and you should be extremely careful to find out as quickly as possible if they are qualified to fill the position. It is ridiculous to carry a lookout man who has poor eyesight or is defective in hearing. It goes without saying that the rule must be rigidly enforced of the watchman not being allowed to go aft to do work or leave his post without being relieved. I also still believe that you should carry lookout men who can stand a trick at the wheel. We pay them the same as wheelsmen and I believe both would stand a better watch if the lookout man and wheelsman relieved each other at the wheel.

"In the new ship's log that will be furnished to you the coming season there will be a column in which must be entered the actual distance you are from each visible lighthouse when abreast of it which can be obtained by taking a four-point bearing, and it shall be the duty of the mates to make these observations.

"I also believe that along the line of educating the mates, wheelsmen and lookout men you should make the following rule—that when the mates relieve each other they shall state the course, location of ship, when and where the course was shifted and that the captains should permit the mates to suggest the course, subject, of course, to the captain's accepting it or not. Along the usual courses the mates, lookout men and wheelsmen should familiarize themselves with each lighthouse and fog signal to the extent of knowing if a flashlight, the interval between flashes; and if a fog signal, the interval between blasts.

"In analyzing the probable causes of a good many accidents that have happened during the past few years, I am convinced that two of the most dangerous maneuvers are (a) boats passing each other in narrow channels where there are center ranges, (b) boats bound in the same direction passing each other in narrow channels, and I want to submit to you some ideas that have occurred to me to minimize the possibility of these accidents.

"(a) Since all of the made channels have been widened to from 400 to 800 ft., I have been opposed to center ranges for the reason that so many of the captains use them to steer by and not for the purpose for which they were intended, namely, to mark the center line of the channel; and there is no question but that a great many captains have allowed themselves to drift into the way of thinking that if they should open the ranges they are going to run onto the rocks and, as you are well aware, there are many captains who depend on the approaching steamer to do all the shifting. In other words, there are a great many men who want their half of the channel in the middle and right on the ranges. I assume, of course, that in navigating the made channels, even though they may be 800 ft. wide and plainly marked with buoys on both sides, that it is easier to put the boat right on the center ranges and tell the wheelsman to hold her there; but the easiest way of doing things does not always mean that it is always the safest and in the channels, such as I have mentioned, it seems to me the center ranges should be regarded as the dividing line of the channel, and that we should educate our mates and wheelsmen to steer these channels with the ranges open. It is only a question in mathematics in figuring out how much you can open these ranges to be safely on your side of the channel, and if the rule is made absolute and lived up to that in these made channels of over 400 ft. in width, our boats must be steered, not down the middle of the channel, but on either side, as the case may be, I believe it would be a long stride in the right direction in avoiding collisions in channels where there are center ranges. I believe today there are certain center ranges in the river that are harmful instead of helpful.

"(b) We all know that the passing of boats bound in the same direction is, under certain conditions, a dangerous maneuver. It frequently happens that there is not a great deal of difference in their speed, and with the possibility of meeting boats coming in opposite direction before the overtaken steamer gets clear. Then, again, the overtaken boat may not give all the room she can consistent with her own safe navigation. So far as our boats are concerned I want you to be extremely careful in attempting to pass boats in narrow channels bound in the same direction, more especially if the overtaken boat seems to be reluctant to let you pass. In that event, wait until you get where the channel is wide and there is no danger in passing. I would much rather you would take longer time in navigating the rivers than to run the risk of these costly collisions.

"I now want to make a suggestion in cases where our boats are being overtaken and the overtaking steamer has indicated a desire to pass: Rule 8 provides the signal that shall be blown in case the pilot of a steamer which is astern shows a desire to pass a steamer ahead, and then goes on to say:

> "* * * and the pilot of the steamer ahead shall answer by the same signals, or if he does not think it safe for the steamer astern to attempt to pass at that point, he shall immediately signify the same by giving four or more short and rapid blasts of the whistle, and under no circumstances shall the steamer astern attempt to pass the steamer ahead until such time as they have reached the point where it can be safely done, when said steamer ahead shall signify her willingness by blowing the proper signals. The boat ahead shall in no case attempt to crowd the bow or crowd upon the course of the passing steamer."

"While this rule provides what signals shall be blown by the steamer astern desiring to pass a steamer ahead, it does not state when the passing signals shall be blown, so that we have to go to Rule 4 for this information, which is as follows:

> "* * * The signal for passing by the blowing of whistles shall be given and answered by the pilot in compliance with these rules, not only when passing head and head or nearly so, but at all times when passing or meeting at a distance within a half mile of each other, and whether to the starboard or port."

"A further obligation is laid upon an overtaking steamer in Rule 22 which provides that every vessel overtaking any other shall keep out of the way of the overtaken vessel, and Rule 20 provides that 'whereby any of the rules herein described one of the two vessels shall be kept out of the way, the other shall keep her course and speed,' so that to briefly paraphrase the duties devolving upon the two boats in a maneuver of passing when bound in the same direction is as follows: The overtaking steamer before she gets within half a mile of the steamer ahead and desiring to pass, shall blow a passing signal. If the steamer that is ahead assents to the other steamer passing, she shall answer by the same signal and keep her course and speed. If, however, she does not think it safe for the steamer astern to attempt to pass, she shall immediately signify the same by giving four or more short and rapid blasts of the whistle, when under no circumstances shall the steamer astern

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attempt to pass. When a point has been reached when the steamer astern can safely pass the steamer ahead, the steamer ahead shall signify her willingness by blowing the proper signals, and after the steamer ahead has blown an assenting signal to the steamer astern to pass her, the steamer ahead, under Rule 20, keeps her course and speed. I think it should be laid down as an invariable rule that in narrow channels a steamer will not ask or give permission for passing when bound in the same direction, if they are likely during the maneuver to meet boats bound in the opposite direction.

"It has always seemed to me that when a safe and conservative navigator finds a boat coming up astern that is running faster than his own boat, he would be glad of the first opportunity to let him get by and out of the way. You should be particularly careful to avoid passing boats bound in the same direction, or giving consent to pass you on bends in the channel. This maneuver should only be attempted where the course is straight, and I now want to make a suggestion in cases where our boats are being overtaken and the steamer astern has indicated a desire to pass: If you do not consider it safe for him to pass you, blow the alarm signal required by law. As soon as you have reached a point in the channel of sufficient width where you consider it safe for him to get by before meeting other boats and before reaching a bend in the channel, I would suggest you pull over on your side of the channel, check your engine down with your engine whistle and reduce speed, and then blow the steamer astern an assenting signal for him to pass you. Be sure, however, that you have fixed your course on your side of the channel and done your checking before blowing the assenting signal, because, as I have already stated, after you have blown an assenting signal, it is your duty, under Rule 20, to hold your course and speed.

"You will remember last year I took up the question of boats steering on outside courses when bound east. It seemed to have raised a good deal of discussion, but I noticed on my trips up the lakes a good many of the boats were doing it. I would like to have a little further discussion on this subject.

"Complaint has been made to me that many of the masters of our steamers are not giving the proper signals for opening bridges and more especially is this true with reference to the Northern Pacific Wisconsin draw bridge at St. Louis Bay. I sincerely trust you will all be particularly careful to obey the law with reference to the blowing of signals for the operation of draw bridges.

"Mr. Harvey has had prepared some statements of costs which he will discuss with you this afternoon. As soon as we get our accounts made up for the year, comparative statements of such items of expense as are controlled by the captains will be prepared, and copies furnished you which, of course, you will treat as confidential. Our costs are high, and I solicit the earnest co-operation of you all, both captains and our shore force, in endeavoring to reduce them. Each item of expenditure must be closely watched and every effort made to prevent waste.

"As heretofore, your judgment must obtain as to when it is necessary to use tugs. This is a large item of expense, and if you have plenty of time and by going slow you can get along without them, do so.

"The consumption of fuel is the greatest item of expense on our steamers and I want you to work closely with your engineers and see that any short weights and poor quality are promptly reported to us, and if during the season you believe you could make a better showing by making any changes in speed or in any other way, advise us by letter so that we can consider it. I believe we are not paying sufficient attention to be sure our wheel blades are all in align, and this should receive your most careful attention.

"I am disappointed that we were not able to make a better showing in our cost of supplies. Some suggestions will be made to you with the hope of reducing the costs.

"In closing I want to say that you must broaden out beyond the point of pilots and regard yourselves as the chief executive on board your ships—responsible not only for the safe navigation and upkeep, but for her operation, and every item of costs, whether for paint, rope, cabin supplies, or anything else should be carefully considered by you personally and not simply take the word of the mate or steward that it is needed.

"The story is told of a young art student who was watching the great painter, Sir Joshua Reynolds, at work and who asked Sir Joshua what he mixed his paints with. The answer came as quick as a flash, 'Brains, young man, brains,' and that is what is needed in every department on our ships.

"During the past year you have done well. No fleet on the lakes is better officered than ours, or made a better showing, but in order to hold that position requires the very best effort of us all." (Applause.)

CENTER RANGES.

Editor MARINE REVIEW:—Referring to article in MARINE REVIEW of Jan. 23 re the abolition of the center ranges, I am decidedly of the opinion that there are two sides to the question.

Admitting that while there undoubtedly is a tendency on the part of some to hold their vessels pretty well on these ranges at night, regardless of other persons' rights, we find that generally the same men in daylight, apparently consider their half of the channel is to be taken out of the middle, whether they might be using a stretch of the river where there are center ranges or otherwise, and it appears to me that as this is a not uncommon practice with some when channel buoys are plainly visible. The center ranges are hardly at fault for all they are blamed for.

Of the numerous collisions in the Detroit and St. Clair rivers during the season of 1907, while we have no statistics covering them, there was to the best of my recollection only about 20 per cent or 25 per cent of them which occurred on those stretches of the rivers, which are covered by center range lights and from what I understand, about half of this small percentage was contributed to by steering gears going wrong and other conditions of which the fact that there was a center range at the particular stretch of the river had no bearing whatever, leaving but an extremely small per cent that might possibly be attributed to the center range.

In St. Mary's river, from the Encampment to Pt. Iroquois, it is practically all a buoyed channel, the serious collisions have been few in comparison with the traffic and it is on these center range lights our wheelsman has his mark to steer by and steady his vessel on.

The channels have never been widened in proportion to the growth in size of the ships, and while some years ago the smaller vessel might make a course like a rail fence, she would, as a general thing, come back on the helm without much danger of striking, but the large vessel of the present day must be kept reasonably steady to prevent either one end or the other from striking and to keep them so the wheelsman must have some mark to steer on or by, and in most places where center ranges are located, they are the only mark there is at night.

During the season of navigation we experience night after night, atmospheric conditions which render it very hard to estimate correctly the distance one is

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from either bank or other object in the river.

Providing the center range is abolished, is it not reasonable to assume, there will be more liability of danger under these conditions, among the cleverest and most conservative of our pilots, in their endeavor to keep moving and at the same time feel assured they are clear of the channel bank, are they not apt to crowd one another more than they would if there were lights to indicate the center of the channel, which assures them of how much they can give? Shore lights are all very well for marks to steer by, to turn on, etc., where we have them, but in a majority of places where the center ranges are located, we do not happen to have shore lights thereabouts. It appears to me that that is a subject for due consideration before anything is done that might possibly be a step back.

Detroit, Feb. 4. NAVIGATOR.

ANOTHER SIDE OF THE CASE.

Editor MARINE REVIEW:—Dear Sir—Last week's REVIEW contained a statement by a prominent vessel owner that "the master that knows his business does not need the center ranges; he can get along without them." Right you are, captain. He can also get along without buoys and shore lights—after a fashion; and while you are at it let us abolish stakes, buoys and all the aids to navigation that he has used so long, for he can also get along without them—if he has to.

When the speaker was sailing he never had any trouble in getting along without them. Of course not. It was the proper caper to let go the anchor or tie up to a wood dock on the approach of night, and, too, the tonnage of that day could run on a heavy dew. The master of today does not drop his anchor and wait for daylight merely because the night is dark. If he did he would need no ranges. The use of ranges does not lead to collision, but it is their misuse. At least one of the collisions of last year would not have occurred if there had been a range to mark the center of the channel, and this is at a point where masters have been asking for a range for some time.

It is true that some masters play hog to the extent of sticking more closely to the ranges than necessary in meeting another steamer—but that is not the fault of the range by any means. Remove the range and what happens? A steamer entering a long, dark channel at night heads between the channel bank lights. If another steamer is coming in the opposite direction they head on each other just as if they were on a range and the effect of crowding is the same as a mark of the axis of the channel. As a steering mark and as a tab on our compasses the ranges are among the most useful aids to navigation, and what we need is more of them instead of less.

As for the captain who "has been with us for 20 years, and has never had any kind of an accident whatever," I have frequently met him in the rivers and if he took any particular pains to keep off the ranges, I saw no indication of it. There is a whole lot more might be said about this matter, but I will let some of my brother masters tell it. I write this for a starter.

A MASTER.

Cleveland, O.

AUTOMATIC CIRCULATOR FOR SCOTCH BOILERS.

Marine engineers responsible for the condition and efficient running of Scotch boilers are fully aware that the great drawback with this type of boiler is defective circulation. They are aware, also, that the difference in temperature prevailing between the upper and lower parts of the shell, heating surfaces, and other component parts, due to this defective circulation, produces unequal stresses and strains in the metal, with the result that sooner or later the condition of the boiler is such that it demands constant attention and care. With the Scotch boiler great care must be exercised in raising steam to see that circulation is promoted by artificial means, otherwise the strains brought to bear on the joints and seams by unequal expansion will eventually spring the seams and irretrievably ruin the boiler.

The most common method employed in circulating the water during the period of raising steam consists in drawing the water of low temperature from the bottom of the boiler and delivering it through the feed line at the upper part. Occasionally the feed water heater is brought into play. The only advantage gained in promoting circulation by such means when steam is being raised, however, is that an equal temperature is created throughout the boiler. This relieves to some extent the strains which would otherwise exist, arising from the presence of stagnant water at low temperature beneath the line of the firebars and water in circulation at high temperature above it. Satisfactory circulation cannot be maintained in a Scotch boiler by mechanical means.

Copeland's patent automatic circulator has been designed to establish automatic movement of the water in Scotch and other internal furnace boilers, for the purpose of equalizing temperature, preventing incrustation, and increasing efficiency and durability. It is an exceedingly effective device, simple in application, and is the outcome of much experimenting on the part of Mr. E. T. Copeland, the inventor. By its use the entire contents of the boiler are brought into active circulation, producing a uniform temperature throughout and removing all danger of defective seams and rivets caused by the unequal expansion of the parts. No mechanical operation to produce circulation need be resorted to during the period of getting up steam, the Copeland circulator inducing a natural and automatic movement, through the most remote sections of the water space coincidentally with starting fires.

Boilers installed with the Copeland automatic circulator have been equipped with permanent thermometric appliances for testing the temperature of the water as it is drawn from the extreme bottom of the boiler, below the furnaces, and other unfavorable locations. The results of tests show that boilers under 60, 100 and 150 lbs. pressure register respectively 14, 11, and 10 degrees difference between the temperature of the steam at recorded pressure and water taken from the bottom of the boiler.

The offices of the E. T. Copeland Company are at 100 William Street, New York, N. Y., where further information can be obtained and specific plants discussed with a view to installation.

The partnership of C. Clemente and R. A. Heiser, under the firm name of the C. Clemente Co., has been dissolved by mutual consent.

The German government's naval program, embracing estimates of expenditure of more than $100,000,000 annually for 10 years, passed the second reading in the Reichstag on Jan. 28, only the Socialists and the Poles opposing it.

The house committee on naval affairs has decided upon making a cut of about $25,000,000 in the estimated cost of maintenance and construction for the navy department for the coming fiscal year. The navy department asked for $125,000,000, a considerable part of which comes under estimates for the construction of buildings at the navy yards. The larger part of the $25,000,000 reduction is on this class of work.

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ATLANTIC COAST GOSSIP.

Office of the MARINE REVIEW,
Room 1005, No. 90 West St.,
New York City.

The Cunard liner Mauretania arrived at Queenstown on Jan. 30, after a passage of 5 days, 2 hours and 41 minutes, at an average speed of 23.90 knots. The daily runs were 553, 536, 540, 575, 574 and 155 miles, the run from Tuesday noon to Wednesday noon of 575 miles being a record day's steaming for the eastbound passage. She averaged for the nautical day 24.87 knots.

Several of the passengers making the cruise round the West Indies in the Hamburg-American liner Oceana were marooned at Kingston, Jamaica, owing to their failure to join the vessel at the time fixed for her departure from the port.

Now that some individual is prepared to prove that the Chesapeake flag bought at auction in London for $4,250 is not the flag of the U. S. S. Chesapeake, and others, contending that no charge was sounded at Balaklava, doubt the authenticity of our bargain Balaklava bugle, we realize the price of patriotism.

The life savers of the Coskata station on Jan. 30 rescued the crew of the Newport brigantine Fredericka Scheppe, which went ashore on the north side of Coatue Beach. The Fredericka Scheppe left South Amboy, N. J., on Jan. 26, with a cargo of coal for Maine. She is owned by the Gilbert Transportation Co., of Mystic, Conn., and was built at Northport, N. Y., in 1877.

Beginning in May, the Hamburg-American Line will despatch from New York, in addition to its fleet of six vessels maintained in conjunction with the Hamburg South American Line, the new steamships Prinz Oscar and Prinz Adalbert to South America. This improvement in the service is due to the increasing popularity of the route and South American commercial interests.

The new steamers are elegantly equipped and propelled by twin screws. There will be monthly sailings for Pernambuco, Rio Janeiro, Santos and other ports.

Incoming liners arriving at New York in the early part of the week bore evidence of the heavy weather encountered during the passage. Many were from 12 to 24 hours over due.

During a gale encountered by the British steamer Dunotter Castle, from Colon for New York, the piano broke from its fastenings and rolled about the saloon. None of the passengers were injured by the turning of the worm.

A bill increasing the compensation of officers of the United States Revenue Cutter Service has been passed by the senate. The increase will amount to about $100,000 annually.

The French liner Savoie arrived at New York on Sunday with her foremast cracked just below the crow's nest. Her captain reported encountering extremely heavy weather.

New York customs officials have expressed themselves as being worried at the outlook for the future in the new custom house. Although the new building has only been open for occupation three months all the accommodation has been taken up, and investigation has shown that, contrary to the understanding existing in customs circles prior to the opening of the new building that the structure was to be devoted exclusively to the customs business of the port, offices have been assigned to various individuals connected with other government departments.

From Halifax, N. S., comes the report that 16 vessels were wrecked or damaged along the Nova Scotia coast during the gale of Saturday. In Halifax Harbor the quarantine steamer Argus was wrecked, the schooners Ceto and Fannie E. Smith were driven ashore, and a score of vessels were badly damaged.

Robert Floyd, until a year ago general passenger manager for the Cunard Line, died last week at his home in New York City. During most of his life Mr. Floyd was associated with the steamship business. He was at one time general agent of the Inman Steamship Co., transferring his services to the Cunard Line in 1887.

The portion of the cargo of the Mount Temple which was too badly damaged by its submergence to be forwarded to its destination has been sold at auction in Halifax. It is estimated that close on $100,000 was realized.

Capt. Dow, of the wrecked seven-masted schooner Thomas W. Lawson, arrived at New York on Sunday on the American liner Philadelphia. He carried his arm in a sling, his wrist having been broken when he was thrown ashore on the rocky coast at the Scilly Isles. The engineer of the Lawson, and only other survivor, arrived here about three weeks ago.

The steamship St. Cuthbert, Capt. J. Lewis, bound from Queenstown to New York, was abandoned on fire on Feb. 5. Capt. Lewis and 36 members of the crew were rescued by the White Star liner Cymric, which stood by the blazing craft for nine hours. Fifteen of the crew of the St. Cuthbert were drowned in an attempt to leave the burning steamer on Sunday afternoon, the life boat having been swamped.

The St. Cuthbert was a single-screw freighter of about 7,000 tons, and was built by Swan & Hunter, of Newcastle, England, in 1895.

Messrs. Harland & Wolff, Ltd., have let contracts for the fans to be installed upon the new Holland-American liner Rotterdam, which they are now completing. The contract calls for four 50-in. Sirocco fans, and 21 other fans of the same make 30 and 35 inches in diameter, all driven by direct coupled motors. The Sirocco fans, although used upon many of the latest vessels of the United States, English, German, Japanese, Italian and Russian navies, the ships of the International Mercantile Marine and other lines, have been manufactured only in Belfast. They are now to be made in the United States by the Sirocco Engineering Co., of New York, in the new plant just completed at Troy.

ANNUAL CONVENTION AMERICAN ASSOCIATION OF MASTERS, MATES AND PILOTS.

The twenty-third convention of the American Association of Masters, Mates and Pilots met in Washington, D. C., from Jan. 20 to 27. The following officers were elected for the ensuing year: Capt. John H. Pruitt, of New York, national president; Capt. Irving P. Grace, of New York, first vice president; A. R. Mackay, of Pittsburg, second vice president; Capt. G. H. Wellington, of San Francisco, third vice president; C. L. Warwick, of Baltimore, secretary; George W. P. Overman, of Norfolk, treasurer; Capt. L. B. Dow, of New York, grand counsel.

The Gas Engine & Power Co. and Charles L. Seabury & Co., Morris Heights, N. J., are fitting new boilers in the big steam yacht Niagara, owned by Howard Gould.

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ORE SHIPMENTS IN 1907 FROM THE LAKE SUPERIOR DISTRICT

In connection with this issue, the annual table of ore shipments from the mines in the Lake Superior district is published. The chart shows that there was shipped in the period from Jan. 1, 1907, to Dec. 31, 1907, by lake and by rail 42,245,070 gross tons. The all-rail shipment was not so great as in 1906, amounting to 956,315 tons. The lake shipment of 41,288,755 tons is the largest in the history of the Lake Superior region and exceeds the last year shipment, 37,513,589 tons, by nearly 4,000,000 tons. Of the total tonnage moved, 65 per cent was shipped from the Mesabi range; 4 per cent from the Vermilion; 8.6 per cent from the Gogebic; 10.4 per cent from the Marquette; 11.7 per cent from the Menominee and 0.3 per cent from other mines. Of this ore, it is safe to say that, approximately, 60 per cent was of Bessemer grade. The Steel Corporation, through the Oliver Iron Mining Co., shipped an aggregate from the various ranges of 22,710,898 tons, or 56 per cent of the entire output. The other large producers, in the order corresponding to the amount of ore each shipped, were: Corrigan, McKinney & Co., Pickands, Mather & Co., Cleveland-Cliffs Iron Co., Oglebay, Norton & Co., and the Republic Iron & Steel Co., which mined, respectively, 3,020,933 tons, 3,014,980 tons, 2,399,363 tons, 890,097 tons and 774,493 tons. Including ore shipped for interests other than their own, M. A. Hanna & Co. moved 5,014,639 tons.

As compared with previous years, the shipments from the Mesabi range, which dwarf by contrast the output of any of the other ranges, in the 1907 output show a proportional increase. In 1904, the Mesabi mines yielded 12,156,008 tons; in 1905, 20,153,699 tons; in 1906, 23,792,454 tons and during last year 27,492,949 tons. This increase of 4.2 per cent this year over 1906 compares with an increase of 3.1 per cent in 1906, 3 per cent in 1905 and 2.7 per cent in 1904. The mines on the Mesabi range shipping for the first time in 1907 added 591,809 tons and included the Alberta, Canisteo, Diamond, Fowler, Gilbert, Hartley, Holman, Mariska, McKinley, Onandago, Nassau, Spring and Yawkey. Of these, seven are shaft properties, and five, all belonging to the Oliver Iron Mining Co., are open pits. The largest shipper in 1907 was the Hull-Rust pit of the Steel Corporation, which displaced the Mountain Iron record in 1905 with an output of 2,900,493 tons. The other mines shipping more than 1,000,000 tons from Minnesota were the Adams and Fayal at Eveleth, the Burt, Morris, Mahoning and Stevenson at Hibbing, the Virginia and Mountain Iron. In this year's table, all the shipments heretofore credited to the Aetna mine are now included in Mountain Iron, and the output of the old Cloquet mine is now included in the Spruce.

The shipments from the Gogebic range were slightly less than those of 1906, and the largest shipper was again the Norrie group, from which was mined 1,009,085 tons. The Aurora and Pabst mines are now included in the Norrie group, and are so presented in the table. Shipments from the Marquette range were 281,567 tons in excess of the 1906 production, but a decrease of 144,360 tons is shown in the Menominee range shipments. There were no new mines from which ore was shipped on the Gogebic range, but in the Marquette district, the Austin, Empire, Maas and Stevenson, which, with the exception of the Empire, are properties of the Cleveland-Cliffs Iron Co., sent out their first ore. The new mines of the Menominee range were the Chatham, Fogarty, Hollister, James and Kimball and the total number of new shipping mines in the Lake Superior district during the year was 22.

The quantity of ore shipped from the new mines of the Marquette range amounted to 99,098 tons and that from the new mines of the Menominee range 47,787 tons. The shipments from the Helen mine by way of Michipicoten are given below and were 142,832 tons.

SHIPMENTS BY RANGES, GROSS TONS.

	1907.	1906.	1905.	1904.	1903.	1902.
Marquette Range	4,388,073	4,057,187	4,210,522	2,843,703	3,040,245	3,868,025
Menominee Range	4,964,728	5,109,088	4,495,451	3,074,848	3,749,567	4,612,509
Gogebic Range	3,637,907	3,643,514	3,705,207	2,398,287	2,912,912	3 663,484
Vermillion Range	1,685,267	1,792,355	1,677,186	1,282,513	1,676,699	2,084,263
Mesabi Range	27,492,949	23,792,553	20,153,699	12,156,008	12,892,542	12,342,840
Miscellaneous	76,146	128,742	111,391	67,480	17,913	.....
Total	42,245,070	38,523,439	34,353,456	21,822,839	24,289,878	27,571,121

SHIPMENTS BY PORTS AND ALL-RAIL, GROSS TONS.

	1907.	1906.	1905.	1904.	1903.	1902.
Escanaba	5,761,988	5,851,050	5,307,938	3,644,267	4,277,561	5,413,704
Marquette	3,013,826	2,791,033	2,977,828	1,907,301	2,007,346	2,595,010
Ashland	3,437,672	3,388,106	3,485,344	2,288,400	2,823,119	3,553,919
Two Harbors	8,188,906	8,180,125	7,779,850	4,566,542	5,120,656	5,605,185
Gladstone	.....	.....	5,118,385	4,169,990	3,978,579	4,180,568
Superior	7,440,386	6,083,057	.....	553	35,816	92,375
Duluth	13,445,977	11,220,218	8,807,559	4,649,611	5,356,473	5,598,408
Total by lake	41,288,755	37,513,589	33,476,904	21,226,664	23,649,550	27,039,169
Total by rail	956,315	1,009,850	876,552	596,175	640,328	531,952
Total shipments	42,245,070	38,523,439	34,353,456	21,822,839	24,289,878	27,571,121

PRODUCTION BY MINES.

MESABI RANGE.

Adams	1,136,513
Adriatic	70,187
Agnew	149,084
Albany	437,521
Alberta	31,032
Alexander	120,332
Bessemer	78,012
Biwabik	803,750
Brunt	178,935
Burt	1,501,272
Canisteo	5,454
Cass	36,121
Chisholm	258,793
Cincinnati	6,369
Clark	319,983
Commodore	477,203
Corsica	172,226
Crosby	227,265
Croxton	349,853
Cyprus	260,948
Diamond	171
Duluth	93,120
Elba	134,488
Fayal	1,878,812
Forest	4,840
Fowler	34,014
Franklin	30,926
Frantz	907
Genoa	108,610
Gilbert	100,178
Glen	205,426
Hartley	334,646
Hawkins	270,984
Hector (Hale)	65,952
Higgins No. 2	173,439
Hobart	7,339
Holland	16,908
Holman	8,068
Hull	157,366
Hull-Rust	2,900,493
Iroquois	254,329
Jennings	99,812
Jordan	61,996
Kinney	145,989
La Belle	56,146
Larkin (Tesora)	22,040
La Rue	301,522
Laura	149,410
Leetonia	301,368
Leonard	137,316
Lincoln	297,870
McKinley	17,706
Mahoning	1,564,332
Malta	82,065
Mariska	137
Mayas	113,521
Miller	279,453
Minorca	154,661
Mohawk	128,870
Monroe	156,809
Morris	2,076,388
Morrow	34,935
Mtn. Iron (Aetna)	1,973,519
Myers	153,770
Nassau	19,172
Onandaga	521
Pearce	68,886
Pettit	36,074
Pillsbury	489,718
Rust	213,355
Sellers	155,060
Shenango	387,093
Spring	15,257
Spruce	610,457
St. Paul	113,200
Stevenson	1,142,977
Susquehanna	137,207
Tener	190,903
Troy	100,730
Union	61,825
Utica	304,864
Victoria	90,090
Virginia Group	1,015,717
Wacoutah	158,692
Webb	113,334
Williams	35,267
Winnifred	94,867
Yates	210,726
Yawkey	15,453
Total	27,492,949

MENOMINEE RANGE.

Antoine(Clifford)	100,996
Aragon	441,636
Armenia	36,665
Baltic	189,119
Breen	20,366
Bristol	345,676
Calumet	51,646
Caspian	138,867
Crystal Falls	114,158
Chapin	855,308
Chatham	14,883
Dober	90,358
Dunn	141,992
Eleanor (Appleton)	1,677
Fairbanks (Paint River)	75,805
Florence	178,955
Fogarty	7,949
Genessee	38,984
Great Western	234,492
Groveland	13,913
Hemlock	117,181
Hollister	6,371
James	2,360
Kimball	16,224
Lamont(Monitor)	42,090
Lincoln	714
Loretto	99,779
Mansfield	183,532
Michigan	39,819
Millie	18,691
Munro	46,834
Nanaimo	53,778
Penn Iron Mining Co.	381,128
Pewabic	457,796
Saginaw(Perkins)	26,080
Tobin	237,781
Vivian	48,493
Youngs	92,632
Total	4,964,728

GOGEBIC RANGE.

Anvil	39,923
Ashland	298,056
Atlantic	91,759
Brotherton	104,224
Cary (Superior)	209,407
Castile	6,157
Colby	94,480
Eureka	57,904
Germania	19,319
Iron Belt	17,347
Ironton	190,968
Mikado	163,891
Montreal	159,763
Newport	551,873
Norrie Group	1,109,085
Ottawa	46,424
Pike	24,922
Sunday Lake	101,899
Tilden	312,496
Yale	38,010
Total	3,637,907

MARQUETTE RANGE.

American	13,764
Austin	195,950
Beaufort(Ohio)	78,029
Breitung Hem. No. 2	59,667
Cambria	135,145
Champion	107,577
Cleve'd Cliffs Gr'p.	1,030,928
Empire	40,565
Hartford	328,161
Imperial	55,756
Jackson	61,345
Lake Angeline	283,373
Lake Superior	674,066
Lillie	80,545
Maas	32,378
Mary Charlotte	155,633
Negaumee	296,170
Princeton (Sw'nz'y)	177,863
Queen(Blue)	309,917
Republic	170,554
Richmond	35,156
Rolling Mill	49,204
Stephenson	6,305
Volunteer	10,022
Total	4,338,869

VERMILLION RANGE.

Chandler	245,684
Pioneer	830,700
Savoy	43,320
Sibley	226,835
Soudan(Minnesota)	102,977
Zenith	235,751
Total	1,685,267

MISCELLANEOUS.
(In Wisconsin.)

Iron Ridge	3,966
Illinois	72,180
Total	76,146
Helen	142,832

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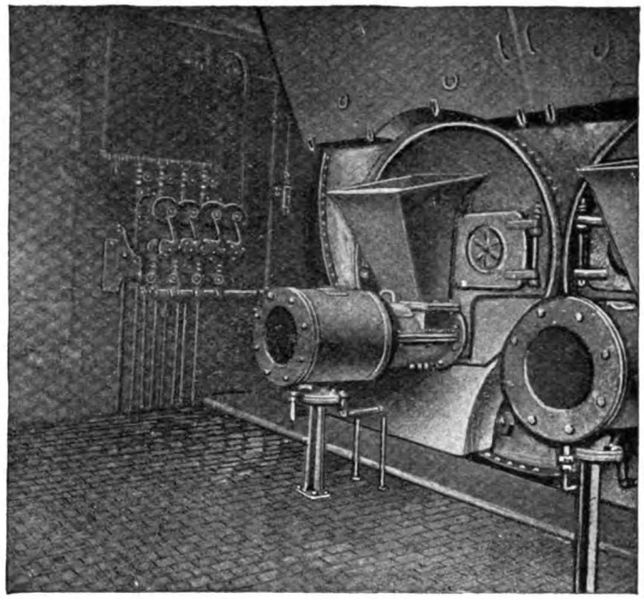


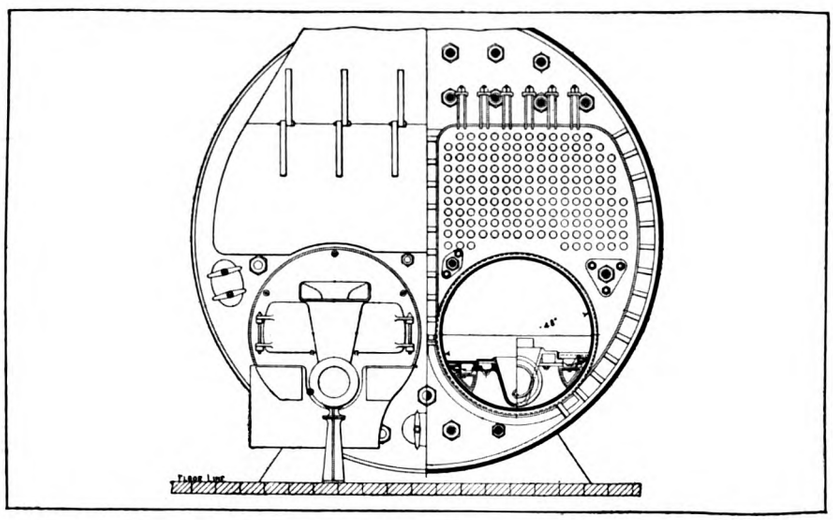
A PARTIAL VIEW OF THE ZIMMERMAN'S FIREHOLD WITH BRICK FLOOR.

not only lessens the consumption of fuel but increases the actual carrying capacity of the boat. Moreover the Jones stoker by insuring perfect combustion reduces smoke to a minimum, Chief Engineer Stewart saying that black smoke is never in evidence on the Zimmerman and that only at periods from one and a half to three minutes, when fires are being cleaned, is smoke, ranging from very light to dark gray, visible at the stack. The Jones under-feed system reduces labor and simplifies the problem of firing. As concrete evidence of this, Chief Engineer Stewart says that in the case of another steamer he shipped 176 firemen in 94 days, whereas on the Zimmerman he shipped only six during the entire season. The installation of the stoker aboard the Zimmerman is shown in the accompanying wash and line drawings.

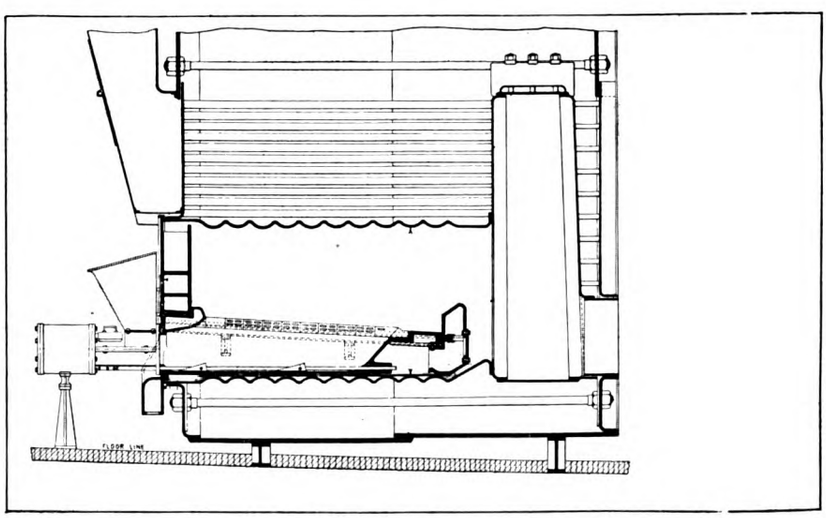
JONES STOKER.

The Under-Feed Stoker Co., 834-847 Marquette building, Chicago, Ill., recently issued a booklet on the Jones stoker in marine service. This booklet is of interest to lake vessel owners as it deals with the installation of the stoker aboard the lake freighter Eugene Zimmerman. The stokers were installed in the two 40-in. Morrison furnaces to each boiler when the boat was built and therefore had two years' constant service. J. D. Stewart, chief engineer of the Zimmerman, in writing of the stoker, said: "We have all the steam required, pressure not varying 3 lbs. from a fixed mark; have no trouble at all with the system worth referring to. Our firemen like the system, as evidenced by the firemen staying here over a year."

In the Jones system automatic control of the fuel and air supply and proportionate regulation of these elements by the steam pressure furnishes all the steam required under any condition. This secures the greatest economy in the use of fuel and increases the general efficiency of all machinery on shipboard depending upon steam power. Chief Engineer Stewart says that the Zimmerman makes a saving of about $70 in fuel on each trip of 15 days' duration as compared with boats of the same class. In comparing the fuel consumption of the Zimmerman with another boat having a carrying capacity of 3,000 tons less than the Zimmerman, it was found that the Zimmerman averaged 35 tons less fuel per round trip while using a coal costing 10 cents per ton less than the other steamer. The stoker



TYPE OF BOILERS INSTALLED ON STEAMER EUGENE ZIMMERMAN.



LONGITUDINAL SECTION THROUGH BOILER AND STOKER.

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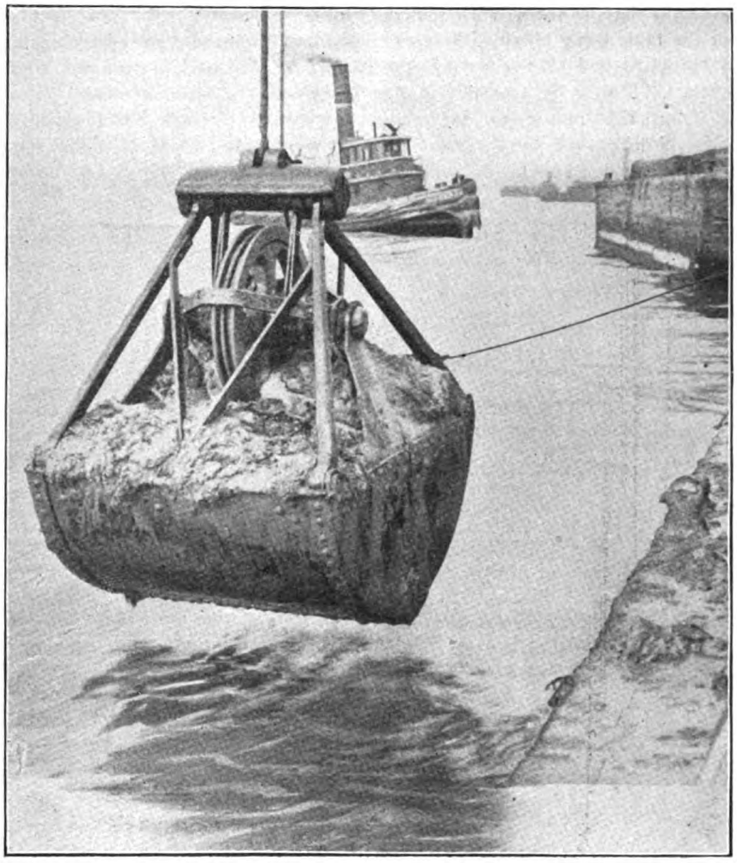
DREDGING MACHINERY.

The accompanying illustrations show two of the many types of dredging buckets built by the Hayward Co., 97 Cedar street, New York. The Hayward orange-peel bucket is especially designed for rough and heavy dredging work, the blades, when open, resembling sharp spades and being so adjusted that the maximum digging effect is produced, with but a slight tendency to lift the bucket while closing. Horizontal arms are riveted to the blades, their inner ends being attached to the central block or casting with suitable bolts having special bushings for reducing the wear, while the outer ends are hinged to the vertical connecting rods, which are pivoted at their upper ends to the upper center block or casting.



HAYWARD ORANGE-PEEL BUCKET IN OPERATION.

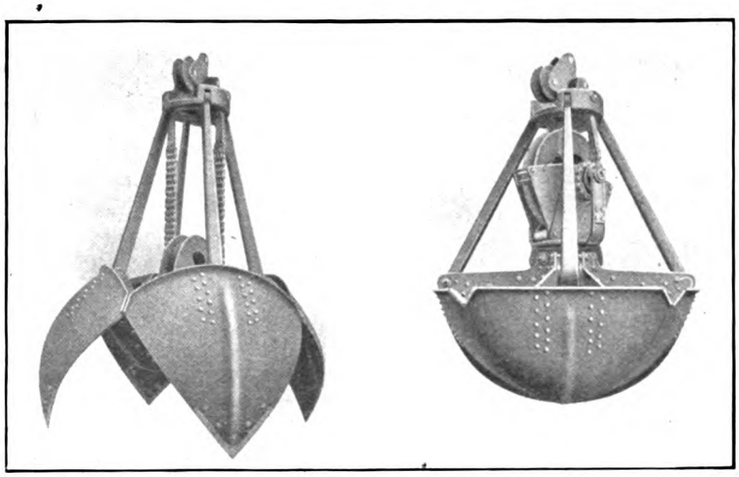
The power wheel for closing the bucket is secured to the lower central casting, and is eccentric in shape, so that it gives its maximum power just as the bucket commences to close. It is well-braced, and the shaft is extended on either side to receive the cams, to which are attached the two power chains. An idler sheave is attached to the upper casting to deflect the closing chain, the supporting or backing chain being attached to the upper casting on the opposite side.

The materials used in the construction of the various parts have been selected with a view to meeting the peculiar requirements necessary in buckets built for dredging use. The blades, blade arms, and connecting rods are of flange steel, the standard blades for all buckets having removable cast steel points which add greatly to the life of the blades. All bolts and pins are of Norway iron, their bushings being of steel or bronze, as may be desired. The power wheel bearings are of phosphor-bronze, the wheels being made to operate by wire or chain.

The illustration is of the extra-heavy standard orange-peel bucket, built in sizes of from 1 to 10 cu. yds. capacity and 5 to 12 ft. diameter when closed. At New Brunswick, N. J., rocks weighing between six and seven tons were handled by a 1½-cu. yd. Hayward bucket, the capacity varying from 300 to 500 cu. yds. a day of 10 hours.

The clam-shell bucket built by the Hayward company is made of two shells or blades, and is used for handling all classes of loose material. Vertical arms are riveted on either side of the blades, their upper ends being connected to the main shaft on which the power wheel for closing the bucket is located. The outer ends of the blades are fitted with lugs which receive vertical connecting rods pivoted at their upper ends to the upper center block or casting. The power wheel and cams are made of one casting. The upper center casting is so constructed that the four connecting rods work from one center, allowing the casting to oscillate and the bucket to hang central under all conditions. An idler sheave is attached to the upper casting to deflect the closing chain, the supporting or backing chain being attached to the upper casting on the opposite side. These buckets are built in sizes ranging from ½ to 5 cu. yds. capacity, and from 3 to 7 ft. in width, when closed.

The Hayward company are manufacturers of all kinds of ore and coal handling machinery, derricks and excavators.



HAYWARD ORANGE-PEEL BUCKET IN OPEN AND CLOSED POSITIONS.

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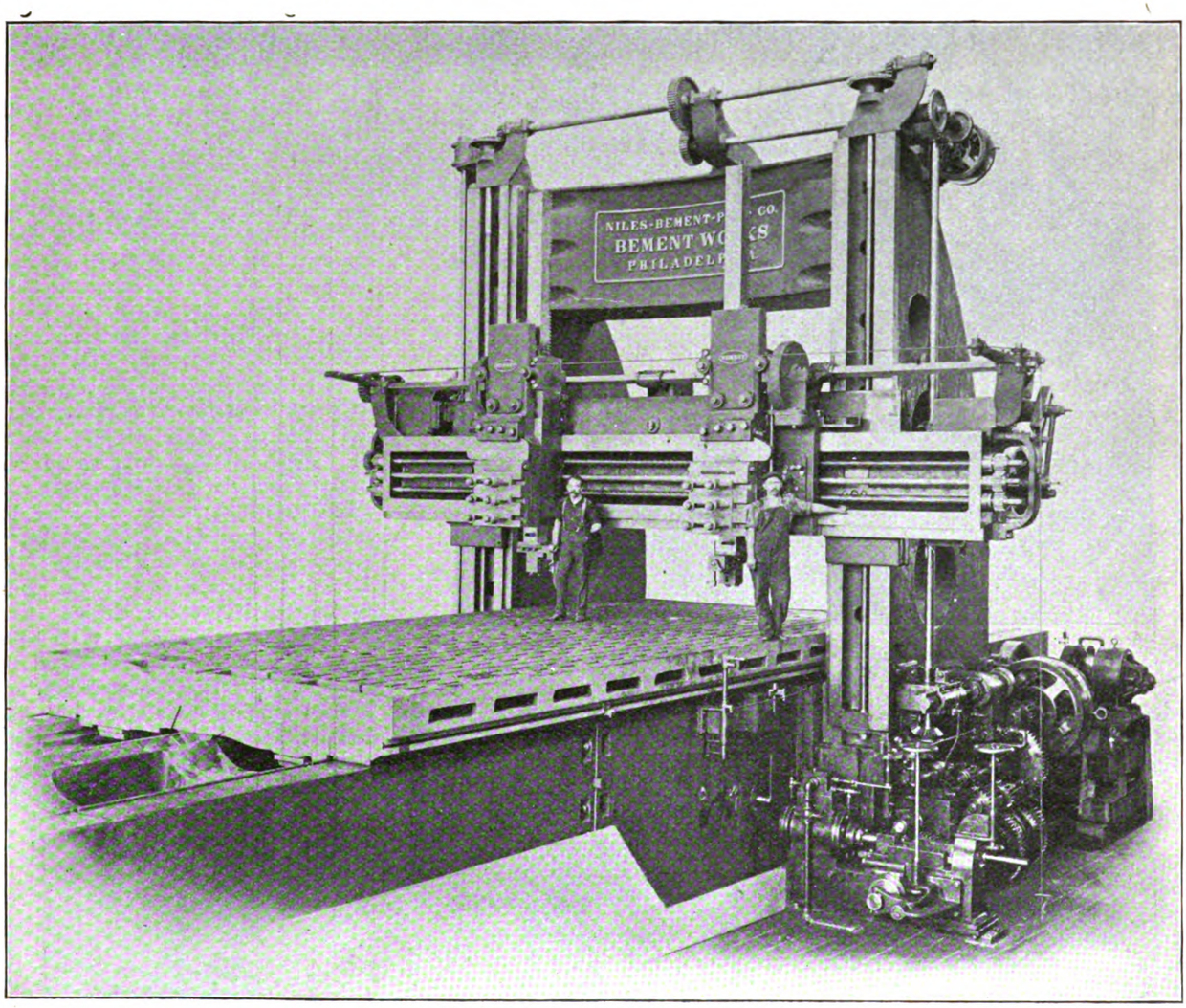
THE WORLD'S LARGEST METAL PLANER.

A metal working planer, now in operation at Pittsburg, Pa., is unique in that it is probably the largest and heaviest machine of its type in the world. Built at the Bement Miles works of the Niles-Bement-Pond Co., this colossal planer weighs 845,000 lbs. or 422½ tons, has a width of 14 ft. 4 in. between uprights and a maximum height of 12 ft. 2 in. from the top of the table to the under side of the cross rail. The table is 32 ft. long, 14 ft. wide and moves on three ways 15 in. wide. It is operated by five motors with a total capacity of 207½ H. P.



GENERAL VIEW OF COMPLETED PLANER—SHOWS MAIN DRIVE AND TABLE FEED FOR TRANSVERSE PLANING.

Several new features, in addition to the usual reciprocating motion, are embodied in the construction of this machine. In the rail heads are incorporated slotter bars with an 8-ft. stroke. One of these heads is also provided with a power reversing cross motion for transpower traverse on the rail, as well as tool slides in heads for quickly bringing them to approximate positions. When slotting certain classes of work the table has to be intermittently fed as on a regular slotting machine. The 100-H. P. main driving motor has a slight variation in speed of the table being obtained by gears suitably proportioned for covering the entire range. Power is transmitted by gearing from the motor to reversing pneumatic clutches of the well-known Niles-Bement-Pond type, having multiple discs whereby great wearing area is obtained in a small compass. The air compressor operating these pneumatic clutches is driven by a 30-H. P. motor and discharges into a large storage tank. This makes the machine independent of the air supply of the works, although connection can be made to that source of supply if desirable.

The action of the table is controlled by a small valve, the automatic reversing movement for alternating the travel being obtained by having table dogs tripping this valve. The 50-H. P. motor for the slotting and cross planing motion also has a slight speed variation, change gears being provided to alter the cutting speed as with the driving motor. This motor is located near the base of the left-hand housing, and drives pneumatic clutches of smaller size and similar to those on the driving side. Power is transmitted through bevel gearing to a vertical shaft, which is made square to eliminate the use of sliding keys under great torsional strain. The square shaft running horizontally above the cross rail is geared to a vertical shaft and drives pinions sliding with the heads and engaging with large spur gears on the ends of the rack pinion shafts. Racks are cut on the backs of the bars.

The length of stroke when slotting or cross planing is controlled by the disc shown above the motor, the disc being driven from the main train or slotter gearing. The adjustable stops on its periphery may be set to any desired point

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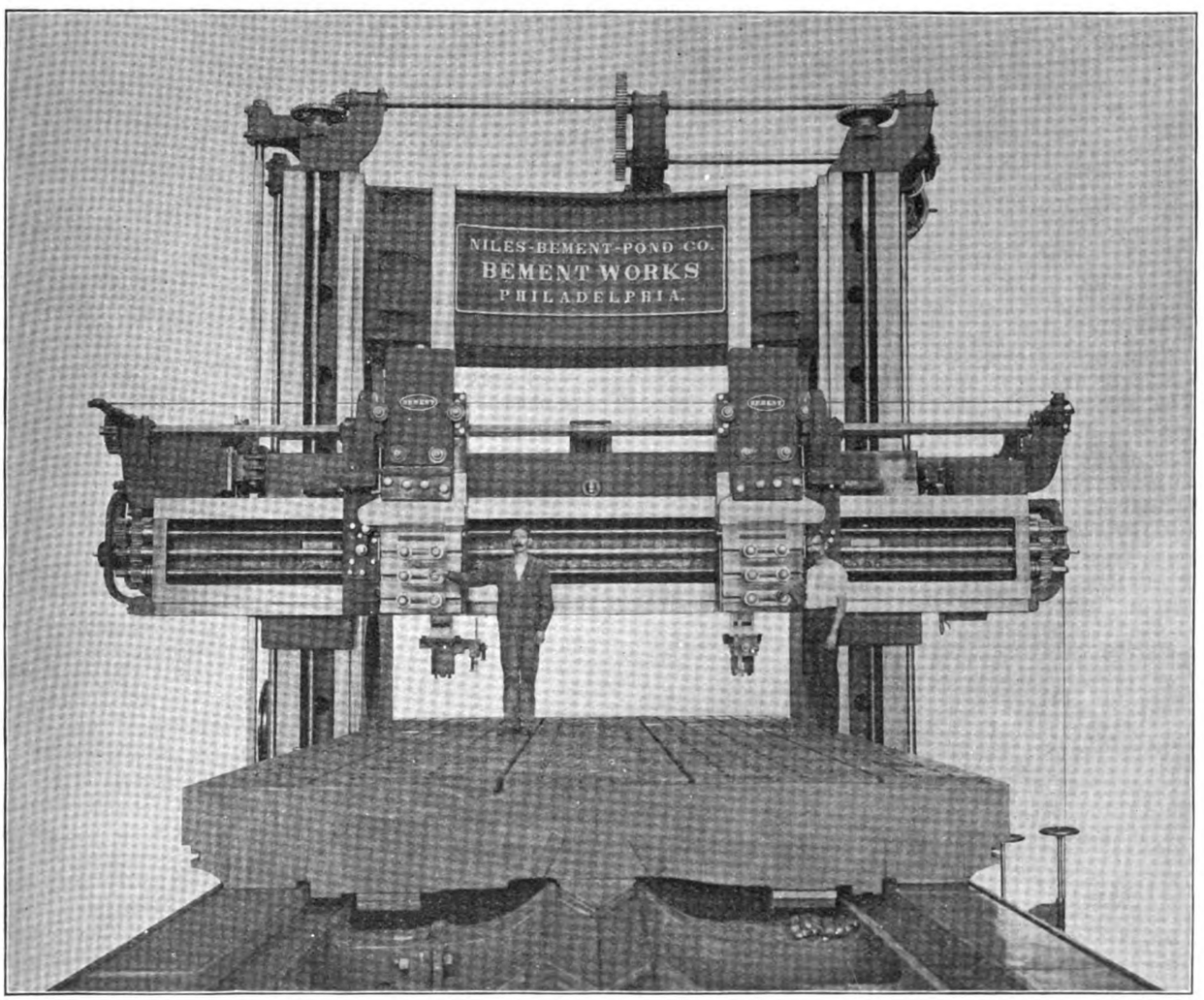
to effect reversal in the same way as dogs on the side of the planer table. Where the reversing hand lever of a standard planer is usually found there is a short, hollow, vertical shaft with an internal shaft, having two sockets on its upper end in one of which is placed a handle. The upper socket attached to the internal portion of the shaft connects with the rod for controlling valve and pneumatic clutches for slotter bars. The lower socket attached to the external portion of the double shaft controls the movement of the table for regular planing and is connected by lever and rods to the automatic reversing dogs on both sides of the bed. Only one handle is provided for each side, thus avoiding mistakes arising from the operation of the wrong handle.

Mounted on the uprights, which are massive castings 25 ft. high and 12 ft. deep, where bolted to the bed, is a cross rail 5 ft. high and of sufficient length to admit full traverse of either head between uprights. On this rail are heads with counterweighted tool slides 7 ft. 8 in. long, having a vertical traverse of 4 ft. This cross rail is raised and lowered by a 20-H. P. motor situated at the top of the upright, the motor being at all times connected with the elevating screws. Horizontal quick power traverse of heads on rail or vertical traverse of tool slides are, by a 7½-H. P. motor, placed on the end of the cross rail. Direction of quick power traverse, stopping and starting, are obtained by friction clutches and are arranged with safety devices for preventing traverse and feed mechanism being engaged at the same time.

The pneumatic feed has fewer parts and greater strength than the usual mechanical feed, and was adopted because of the great weight of the work and table which must be fed across the bed when slotting or cross planing. On the side of the upright just above the gearing is a cylinder with piston rod connected with a rack which again meshes with a gear near the bottom of the vertical feed shaft. This shaft has on its lower end a bevel meshing with another gear on a horizontal shaft which transmits motion to the vertical feed shaft on the left hand upright. The movement of these feed shafts is constant at all times, and variation in amount and direction of head feeds is obtained by adjusting the connecting rods in the slotted cranks on the ends of the cross slide. The feed cranks are graduated in such a way that definite cross and vertical feeds can be obtained, and, by using the cranks on both sides at the same time, an angular feed can be given to the tool, which is at times desirable, as the complete heads were not designed to swivel. The valve for controlling air to the feed cylinder is operated automatically at each end of the stroke, this movement being taken from either the main driving gear train to the table, or the slotter gearing, when slotting. To disengage the feed it is simply necessary to close the valve, cutting off the air supply.

The bed, the total weight of which is



FRONT VIEW OF PLANER, SHOWING BED CONSTRUCTION AND AUXILIARY WAYS.

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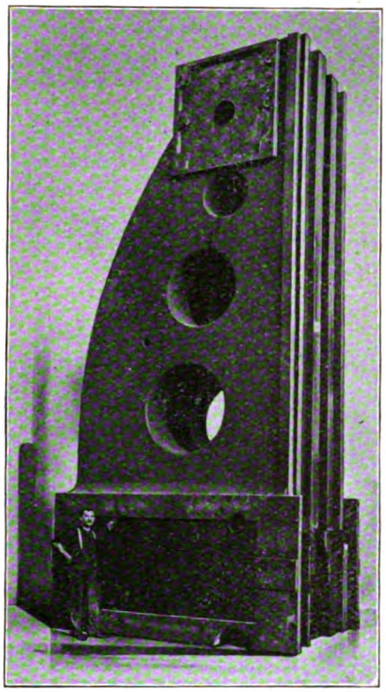


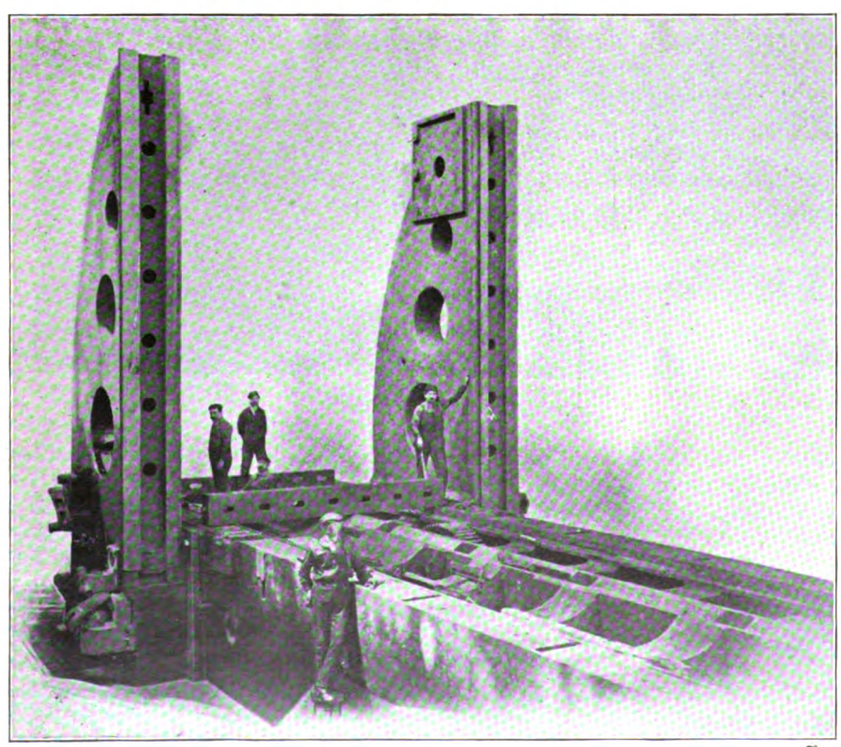
HOUSINGS OF PLANER.

275,000 lbs., is 60 ft. long, 13 ft. wide and 6 ft. 1 in. deep at center. The table weighs 140,000 lbs. Within the bed is a portion of the driving mechanism consisting of two steel bull wheels of large diameter which engage with two racks on the table. The pinions driving the bull wheels are cut directly on the forged shaft with teeth spaced half pitch apart to insure smoothness of motion. The faces of the pinions, bull wheels, and racks are 15 inches wide.

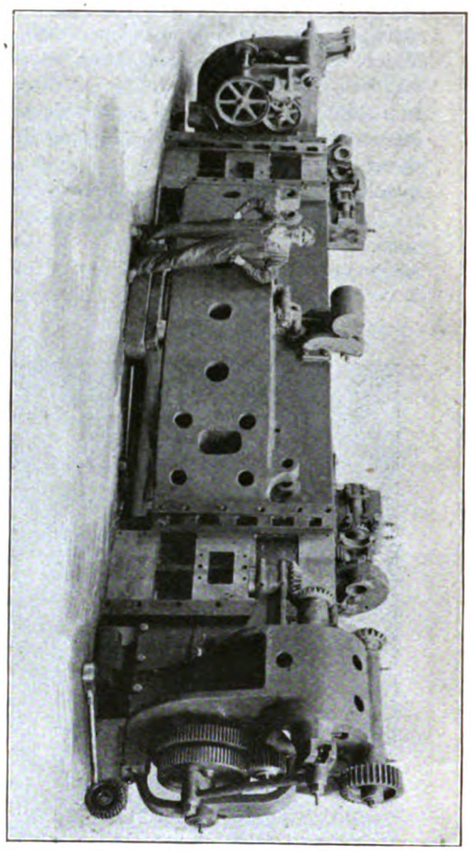
Owing to the great weight and large dimensions of the bed and table it was impracticable, both from a manufacturing and shipping standpoint, to make them in one piece. They were, therefore, divided to bring them within reasonable limits. The central section of the bed is divided longitudinally into three parts, and the two end sections into two parts, or seven parts in all. The table is made in two sections divided longitudinally in the center.

The machine was made by the Niles-Bement-Pond Co. for Mackintosh-Hemphill Co., of Pittsburg.

The American Automatic Oil Filter Co., 1001 Chestnut street, Philadelphia, Pa., have issued a folder descriptive of its automatic oil filter and purifier. The company says that it has never had one returned when put out on trial. They are in use in all classes of factories, electric light and power plants and under all conditions of oil filtration from 10 gal. capacity up to 2,000 gal. The company claims that it is the most economic and reliable machine of its kind on the market. The catalog contains quite a list of references from prominent users, such as the General Electric Co., the Cramp ship yard, League Island navy yard, and others.



PLANER IN COURSE OF ERECTION, SHOWING POSITION OF MAIN DRIVING GEARS.



BACK OF CROSS RAIL OF MACKINTOSH-HEMPHILL PLANER.

ICE MACHINES ON LAKE STEAMERS.

Artificial refrigerating and ice making plants on board our modern lake vessels are proving the wisdom of the owners, by not only showing a good saving over the old method of cooling with artificial ice, but also prove very desirable for the reasons that refrigeration can be had at any time and at any degree at practically no expense after plant is once installed, as labor power and other incidentals necessary to such a plant on land are almost entirely eliminated on ship board.

Refrigerating machines as built and erected by the Cleveland Ice Machine Co., 1615 Merwin avenue, Cleveland, O., are so simple in construction and operation that no additional help is required to operate them. The power necessary to drive them is too insignificant to estimate and the result so satisfactory that all vessel owners would do well to take the question up with this well known firm, who have had 25 years' practical experience in the operating and building of this class of machinery and will be glad to submit a proposition on equipping plants of this nature on board lake vessels or elsewhere.

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The Upson-Walton Co.

CLEVELAND, OHIO

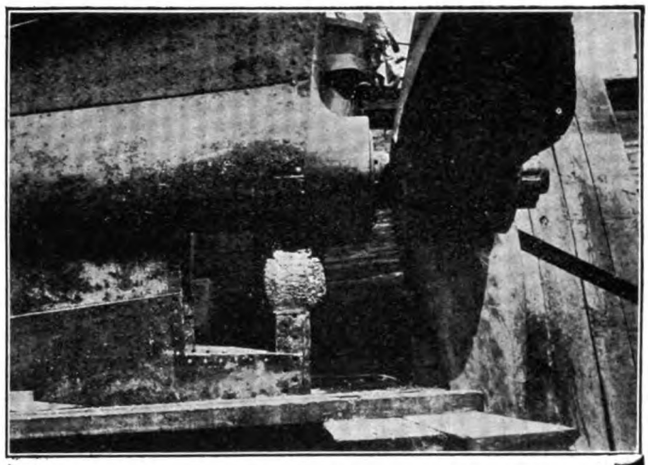
AMONG the first vessels that we fitted out was the Nellie Redington. That was nearly forty years ago, but the Nellie Redington is still afloat.

Among the latest vessels that we have fitted out is the Henry Phipps.

The Redington carries 1,500 tons; the Phipps, 12,000 tons.

As 1,500 is to 12,000 so is The Upson Walton Co. of thirty-six years ago to the Upson Walton Co. of today.

Our reputation as Outfitters of Vessels has grown year by year.



STERN POSTS WELDED
Without Dismantling Vessel

By the THERMIT PROCESS it is possible to effect quick repairs on sternposts, rudderposts, stern frames, rudder frames, crank shafts and other broken steel sections. Thousands of dollars may be saved, due to decreased time of vessel in drydock, and the welded section is made stronger than it was originally, owing to the fact that by the THERMIT PROCESS a collar or REINFORCEMENT of Thermit Steel is fused around the weld.
The Goldschmidt Thermit Company is in a position to contract for all classes of repair work at any port in the United States. Send blue-prints and specifications to the New York or San Francisco Office, and an estimate will be promptly given.
Write for Pamphlet No. 18-E and learn of the many successful repairs on steamships that have been made by the THERMIT PROCESS.

GOLDSCHMIDT THERMIT CO.
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169 Jackson Boulevard
CHICAGO ILLINOIS

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DIRECT REPRESENTATIVE OF LEADING AMERICAN AND FOREIGN UNDERWRITERS

The Kind YOU WANT **THE BEST**

Complete	ENGINEERS' SUPPLIES	AGENTS FOR
Steam Boat Outfitters	PACKINGS	COLUMBIAN ROPE CO. HIGH GRADE MANILA
	PIPE and FITTINGS	BRODERICK & BASCOM ROPE CO. WIRE ROPE
LAUNCH DELIVERY Day or Night	BRASS GOODS	STANDARD OIL CO. MARINE OILS
	VALVES	ERIE OIL CO. MARINE OILS
PROMPT SERVICE	General Repair Work	

The Great Lakes Supply Co.
11 and 13 Main St. BUFFALO, N. Y.

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TRADE NOTES.

The Newton Machine Tool Works, Inc., Philadelphia, Pa., have put out a new general catalog of their machine tools. It is noted that the line of machine tools has been much amplified and many of the machines illustrated are at present being re-designed. The catalog is substantially bound in cloth and every page in it contains an illustration of a different machine tool. This catalog should be in the library of every plant using metal-working machinery.

The Marine Iron Co., Inc., Bay City, Mich., have recently issued a catalog descriptive of their mining, marine and stationary engines. The catalog is very simply and effectively arranged, the description of the machine being clearly printed under the illustration of it. It is of especial interest to vessel owners, showing the company's improved steam windlass and marine steam engines. The company has also designed a ship yard jig-mill especially for the saving of all kinds of ship timber, both for new work and dry dock purposes.

The George F. Blake Mfg. Co., 114-118 Liberty street, New York, recently issued Bulletin B-808 giving list of parts of Blake pumps.

The Knowles Steam Pump Works, 114-118 Liberty street, New York, manufacturer of Knowles pumping machinery, have issued a catalog descriptive of their output. This catalog has the proportions of a book and is a most painstaking work. In addition to descriptive matter illustrated with fine wash drawings of their machinery, there is incorporated as well useful information on steam and the evaporation of water. Tables are included of the areas of circles and capacities of cylinders in gallons and cubic feet for 1 ft. length; pressure of water; capacity of pumps; theoretical horsepower required to raise water to different heights. The index is complete to the least detail so that all parts of the catalog are instantly accessible.

The Crescent Machine Co., Leetonia, O., has recently issued a catalog descriptive of its band saw machines, band saw blades, saw tables and jointers. Included in the catalog are four new machines—the Crescent disc grinder, the Crescent single-spindle shaper, the Crescent swing cut-off saw, and the Crescent surfacer. The catalog is both compact and complete, containing descriptions of each saw with illustrations on the corresponding page. The price list is published on the rear pages, together with the freight rate to all parts of the United States.

The Flexible Compound Co., Inc., 3607 Haverford avenue, Philadelphia, have just issued a little circular descriptive of their flexible compound. This flexible compound is an oil product and is neither a paint nor a varnish. The company represents that it is the only perfect water-proof liquid yet produced and from experiments made with it in Cleveland this claim would appear to be well founded. It provides positive protection against the ravages of moisture, salt air and fumes and when mixed with paints or varnishes imparts its properties to them. It gives the highest insulation on covered wires on electrical work. It is well adapted for tarpaulins and hatch covers, as it prevents decay. It will prevent vulcanized rubber from becoming hard and will restore life to old vulcanized rubber. The agents for the compound in Cleveland are J. G. Chadwick & Co., 71 Olivewood street, Lakewood, O., who would be pleased to demonstrate its value to any vessel owner.

One of the most beautiful catalogs that has been brought to our attention is that of the A. S. Cameron Steam Pump Works, foot of East Twenty-third street, New York. This catalog has a very striking cover bearing the acorn, the company's trade mark, with oak leaves surrounding, the cover being stiff and board-like, grained and colored to represent oak. The opening pages contain photographic reproductions of the diplomas awarded by the Chicago World's Fair, the Pan-American Exposition and the St. Louis Exposition to the Cameron Steam Pump Works. The index, carefully arranged, occupies a position in the front part of the book and then follows the introduction. This catalog is the latest production and supersedes all previous issues. The catalog gives a clear exposition of the various pumps that the company builds and a general description of their design and construction. There is a great deal of pump wisdom in the introduction which, owing to its length, it is impossible to reproduce in a brief review. Everyone interested is advised to write for the catalog. Much useful information of interest to pump users is compiled in the rear pages. This catalog represents an outlay of time and money in no inconsiderable sum and is worthy of being in the library of every pump user. Anyone mentioning the MARINE REVIEW may have a copy of this catalog upon request to the company.

The Fort Wayne Electric Works, Fort Wayne, Ind., have issued Bulletins No. 1102 and No. 1103, the first giving a list of plants operating direct current direct-connected generators types MP and MPL and the latter descriptive of Series A. C. arc electric lighting system. The bulletins are accompanied by an index upon a separate sheet.

The American & British Mfg. Co., Bridgeport, Conn., had an interesting exhibition of their 20 H. P., 40 H. P. and 80 H. P. marine and automarine Herreshoff motors at the motor boat show which was held in the Mechanics building, Boston, during the present week. A feature of their exhibition which attracted great attention was the 80-H. P. engine of the celebrated racing boat Den, the holder of the American mile, 30 and 150-mile records.

At the recent annual meeting of the stockholders of the Independent Pneumatic Tool Co. at Jersey City, the following directors were re-elected for the ensuing year: James B. Brady, W. O. Jacquette, New York City; John R. Turner, Jersey City, N. J.; John P. Hopkins, John D. Hurley, James J. McCarthy, John M. Glenn, M. S. Rosenwald and Simon Florsheim, Chicago. The following officers were re-elected at the annual meeting of the board of directors at Chicago: James B. Brady, president; W. O. Jacquette, first vice president; John D. Hurley, second vice president; A. B. Holmes, secretary and treasurer.

Dipper Dredges for River and Harbor Work
Steam Shovels Placer Dredges
Railway Cranes and Pile Drivers
The Bucyrus Company, South Milwaukee, Wis.

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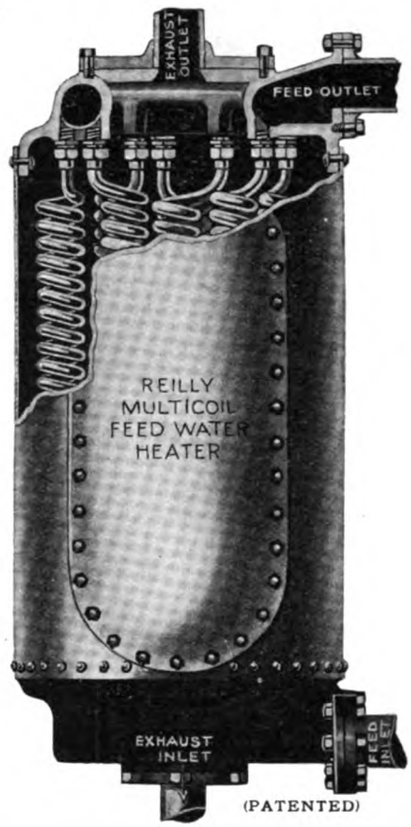
Reilly Multicoil

The Best Marine Feed Water Heater.



(PATENTED)

The Reilly Multicoil Heater combines the greatest efficiency in the smallest space with lowest cost.

It is manufactured as a specialty, not as a mere incidental auxiliary.

The expert attention given to design and performance makes the Reilly Multicoil Feed Water Heater the best in the trade.

The Reilly Heater condenses practically all the auxiliary exhaust steam in heating the feed water, thereby relieving the main condenser.

It requires but one feed pump. Delivers feed water to the boilers at approximately the temperature of the steam in the heater.

The copper coils are very elastic, overcoming the leakage due to expansion and contraction. These tubes are easily accessible and can be readily removed or replaced; they are standard and interchangeable.

The tubes can not accumulate scale, because the constantly changing pressures and temperatures of steam and water keep the coils in constant vibration, and the very rapid, swirling action of the water in the tubes absolutely prevents the lodgment of scale in them.

No other heater has this qualification.

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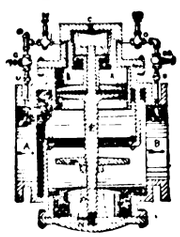

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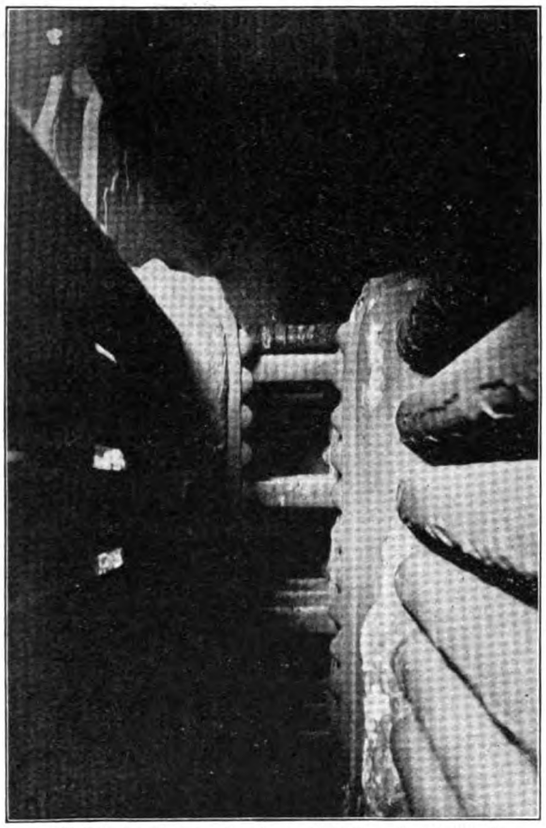

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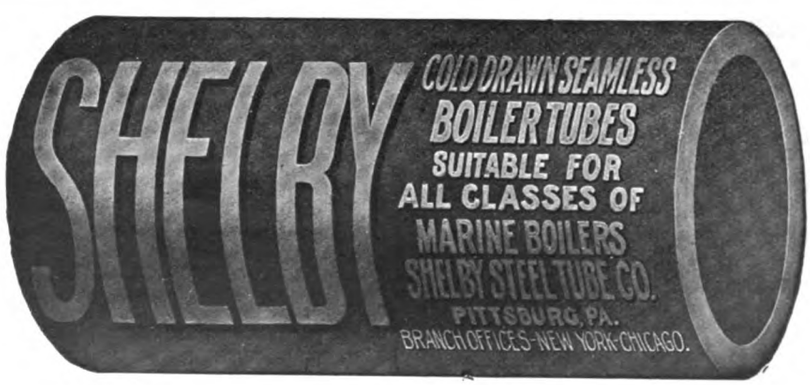

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PROPOSALS.—Sale of U. S. vessels *Pinta* and *Canonicus*.—Sealed proposals will be received at the Navy Department until noon on the 19th day of February, 1908, at which time and place they will be opened, for the purchase of the U. S. vessels *Pinta* and *Canonicus*, appraised values, $1,400 and $6,000, respectively. They will be sold for cash to the person or persons or to the corporation or corporations offering the highest price therefor. A separate proposal for each vessel bid upon must be submitted in a sealed envelope addressed to the Secretary of the Navy, Washington, D. C., endorsed "Proposals for the purchase of the U. S. S.——" (naming the vessel for which offer is made), and each proposal must be accompanied by a satisfactory certified check for not less than 10 per cent of the amount of the offer. On application to the Navy Department, forms of bids and bonds, together with the terms and conditions of sale, also a printed list giving general information concerning these vessels, will be furnished. The vessels can be examined at any time after this date by applying to the Commandants of the navy yards, Mare Island, Cal., and Norfolk, Va., respectively, where they now lie. They must be removed from the limits of said yards within such reasonable time as may be fixed by the department. The Department reserves the right to withdraw either or both of the above-named vessels from sale and to reject any or all bids. TRUMAN H. NEWBERRY, *Assistant Secretary of the Navy*. January 11, 1908.

U. S. Engineer Office, 815 Witherspoon Building, Philadelphia, January 15, 1908. Sealed proposals for constructing one steel, twin-screw suction dredge for Galveston Harbor, Tex., will be received here until 2:30 P. M., February 14, 1908, and then publicly opened. Information furnished on application. J. C. Sanford, Major, Engrs.

U. S. Engineer Office, Milwaukee, Wis., January 24, 1908. Sealed proposals for building reinforced concrete caisson breakwater, pile pier, and plank cribs, removing old pier, and dredging, at Algoma Harbor, Wis., will be received here until 2 p. m., February 24, 1908, and then publicly opened. Information furnished on application. W. V. Judson, Major, Engrs.

U. S. Engineer Office, Jones building, Detroit, Mich., Feb. 4, 1908. Sealed proposals for widening St. Mary's Falls Canal will be received at this office until 3 P. M., March 5, 1908, and then publicly opened. Information furnished on application. Chas. E. L. B. Davis, Col. Engrs.

U. S. Engineer Office, 57 Park street, Grand Rapids, Mich., Feb. 4, 1908. Sealed proposals for repair of South Pier at Charlevoix Harbor, Mich., will be received here until 3 P. M., March 5, 1908, and then publicly opened. Information furnished on application. M. B. Adams, Col. Engrs.

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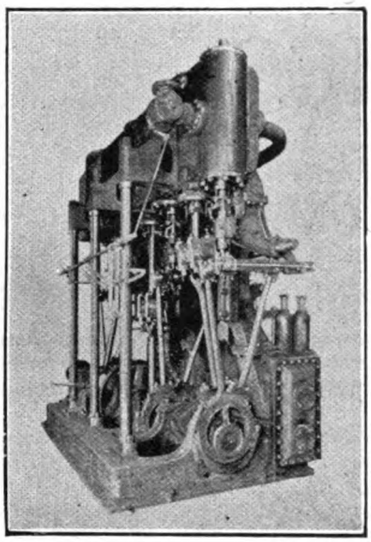

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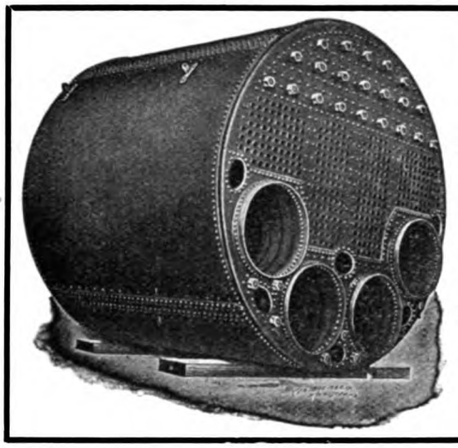

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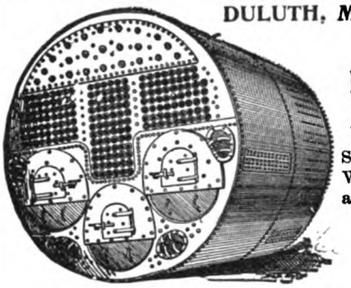

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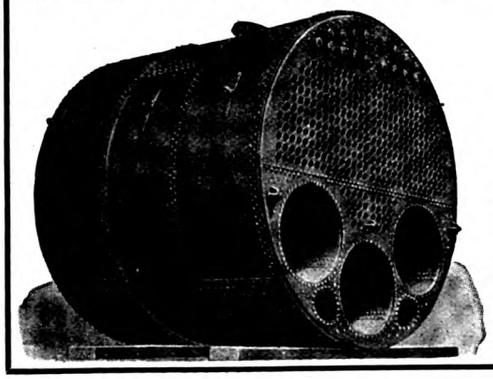

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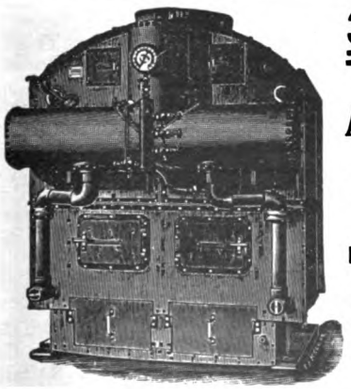

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